



SIMPSON

Strong-Tie

In the Specs – On the Job – At Your Service™

Anchoring and Fastening Systems

For Concrete and Masonry

Product Guide

2012-2013

S-SAS-PGAU12

Tel: (61) 02 9831 7700
www.strongtie.com.au

Tel: (64) (0) 9 477 4440
www.strongtie.com.nz

Quick Facts About Simpson Strong-Tie®

Founded 1956 in Oakland, California, U.S.A.

Home Office U.S.A.
Simpson Strong-Tie
5956 W Las Positas Blvd
Pleasanton, CA 94588 U.S.A.
Tel: 1-800-999-5099

Australia
Unit 1/11 Kenoma Place,
Arndell Park, NSW 2148
Australia
Tel: (61) 02 9831 7700

New Zealand
28 Arrenway Drive, Albany,
Auckland 0632 New Zealand
Tel: (64)(0)9 477 4440

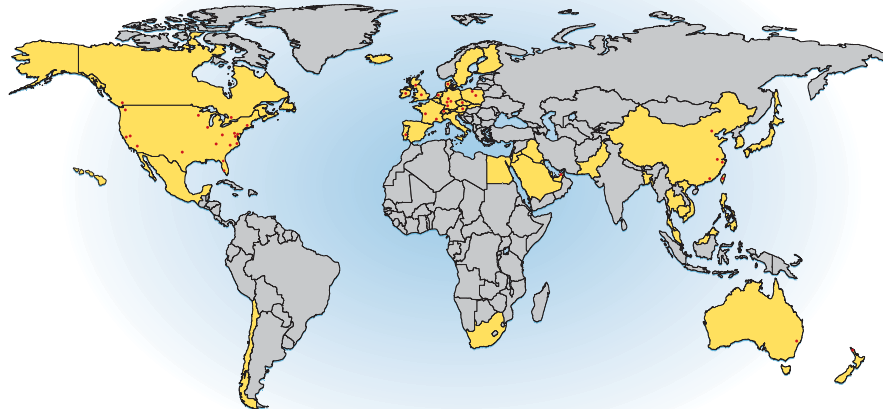
Company Overview For more than 50 years, Simpson Strong-Tie has been helping people build safer, stronger structures economically. The company is the leader in structural systems technology and has earned a reputation for providing customers with innovative, high-quality products, technical and field support, testing and training.

Simpson Strong-Tie designs, engineers and manufactures steel connectors, shearwall panels, and anchor and fastening systems. These products are used to secure the frame of homes and buildings. The company has laboratory facilities that are dedicated to finding solutions to improve the way structures are designed and built and its research is being used to help advance the industry and develop products that help structures resist earthquakes, typhoons and high-wind storms.

Customers Simpson Strong-Tie serves the new construction, retrofitting and do-it-yourself (DIY) markets. Customers include builders, contractors, engineers, architects, building officials, dealers, distributors and homeowners.

Employees Approximately 2,500 employees world-wide

World-wide Locations



● Factories, offices, and warehouses in Asia, Australia, Canada, China, Czech Republic, Denmark, France, Germany, Ireland, Netherlands, Poland, Portugal, Scotland, Switzerland, Taiwan, UK and U.S.A.

■ Distribution in Australia, Canada, Chile, Western Europe, part of Eastern Europe, Middle East, Japan, Korea, Egypt, China, Taiwan & other Asian countries, Mexico, New Zealand, South Africa, UK and U.S.A.

Websites www.strongtie.com.au; www.strongtie.com.nz

Stock Symbol SSD, New York Stock Exchange



Every day we work hard to earn your business, blending the talents of our people with the quality of our products and services to exceed your expectations.

WE ARE ISO 9001-2008 REGISTERED



SIMPSON STRONG-TIE QUALITY POLICY

We help people build safer structures economically. We do this by designing, engineering and manufacturing “No Equal” structural connectors and other related products that meet or exceed our customers’ needs and expectations.

Everyone is responsible for product quality and is committed to ensuring the effectiveness of the Quality Management System.

Table of Contents

Adhesives

Installation Instructions	11
SET-XP® Anchoring Adhesive	12
ET-HP™ Anchoring Adhesive	13
Epoxy Usage Estimation Guide	14
At-HP™ Anchoring Adhesive	16
Acrylic Usage Estimation Guide	17
Adhesive Accessories/Troubleshooting	18–23
ETI Crack Injection Epoxy	25
Crack-Pac® Injection Epoxy	26
Crack-Pac® Flex-H20™ Crack Sealer	27
Crack Injection Accessories	29
Crack Injection Method Statement	30–34

Mechanical Anchors

Ultraplus Undercut Anchor	36–38
Superplus Undercut Anchor	39–40
Safety Bolt Expansion Anchor	41–43
Liebig Anchor	44–45
Titen HD® Concrete Screw	46–47
Throughbolt WA	48–49
Drop-In Anchor	50–51
Blue Banger Hanger®	52–53
Titen Masonry Screw	54
Crimp Multi-Purpose Anchor	55
Nailon™	56
HWA Hollow Wall Anchor	57
Sure-Wall Drywall Anchor	58
SWTB Toggle Bolt	59



Powder-Actuated Fastening

PAT Extension Poles	61
PTP-27L & PTP-27LMAGR Premium Tools	62
PT-27 General Purpose Tool	63
Powder Loads and Fasteners	64
PAT Repair Parts	65

Other

Anchor Selection Guide	4
General Terms/Warranty	5
General Instructions for the Installer	8
General Instructions for the Designer	9
Corrosion Information	6–7
Project Referrals	67–75
Design Software	76

Anchor Selection Guide

	BASE MATERIAL							ALLOWABLE TENSION LOAD ^{1,2}			CODE RECOGNITION ¹
	Page No.	Concrete	Lightweight Concrete over Metal Deck	Grout-Filled Concrete Block	Hollow Concrete Block	Solid Brick	Hollow Brick	500 lbs (2.2 kN) or less	500 lbs (2.2 kN) to 2,000 lbs (8.9 kN)	2,000 lbs (8.9 kN) or greater	
SET-XP™ 	12	● (Including Cracked)						●	●	●	ICC-ES; NSF 61; ETA-11/0360
ET-HP™ (formerly ET) 	13	●	●	●	●	●	●	●	●	●	ICC-ES
AT-HP™ 	16	●						●	●	●	ICC-ES; ETA-11/0139, ETA-11/0150, ETA-11/0151; NSF 61
Ultraplus 	36	● (Including Cracked)						●	●	●	ETA-04/0099
Superplus 	39	● (Including Cracked)						●	●	●	ETA-01/0011
Safety Bolt 	41	● (Including Cracked)						●	●	●	ETA-06/0108
Liebig Anchor 	44	● (Including Cracked)						●	●	●	ETA-06/0123
Titen HD® 	46	● (Including Cracked)						●	●	●	ICC-ES
Through Bolt WA 	48	●	●	●				●	●	●	ICC-ES; ETA-11/0080
Drop-In 	50	●	●					●	●	●	
Blue Banger Hanger® 	52	●	●					●	●	●	
Titen® Concrete and Masonry Screw 	54	●		●	●	●	●	●			
Crimp Anchor 	55	●	●	●		●		●	●		
Nailon™ Nylon 	56	●		●	●	●	●	●			
Hollow Wall Anchors 	57	Plywood			●		●				
Plastic Wall Anchor 	57	●		●	●	●	●				
Sure Wall and Sure Wall Toggle 	58	Plywood and Gypsum Drywall									
Spring Wing Toggle Bolt 	59				●	●					
Powder-Actuated Fasteners	64	●	●	●	●			●	●		ICC-ES

1. Load values and code listings may not be available for all base materials cited in this table. To verify code listed applications refer to the code report at: (Australia) www.strongtie.com.au; tel: (61) 02 9831 7700; (New Zealand) www.strongtie.com.nz; tel (64) (0) 9 477 4440.

Important Information and General Notes

Terms and Conditions of Sale

PRODUCT USE

Products in this catalog are designed and manufactured for the specific purposes shown and should not be used in construction not approved by a qualified designer. Modifications to products or changes in installation procedures should only be made by a qualified designer. The performance of such modified products or altered installation procedures is the sole responsibility of the designer.

INDEMNITY

Customers modifying products or installation procedures, or designing non-catalog products for fabrication by Simpson Strong-Tie Australia Pty Limited shall, regardless of specific instructions to the user, indemnify, defend, and hold harmless Simpson Strong-Tie Australia Pty Limited for any and all claimed loss or damage occasioned in whole or in part by non-catalog or modified products.

NON-CATALOG AND MODIFIED PRODUCTS

Consult Simpson Strong-Tie Australia Pty Limited for product applications for which there is no catalog information, or for anchors or fasteners for use in hostile environments, or with abnormal loading or erection requirements.

Non-catalog products must be designed by the customer and will be fabricated by Simpson Strong-Tie in accordance with customer specifications.

Simpson Strong-Tie cannot and does not make any representations regarding the suitability of use or load-carrying capacities of non-catalog products. Simpson Strong-Tie provides no warranty, express or implied, on non-catalog products.

F.O.B. Shipping Point unless otherwise specified.

SPECIAL ORDER PRODUCTS

Some products can be ordered as special sizes or with other modifications. Contact Simpson Strong-Tie for information on special order products. Additional lead time and charges may apply. Special order products are non-cancellable, non-refundable and non-returnable.

Limited Warranty

Simpson Strong-Tie Australia Pty Limited warrants catalog products to be free from substantial defects in material or manufacturing. Simpson Strong-Tie Australia Pty Limited products are further warranted for adequacy of design when used in accordance with design limits in this catalog and when properly specified, installed, and maintained. This warranty does not apply to uses not in compliance with specific applications and installation procedures set forth in this catalog, or to non-catalog or modified products, or to deterioration due to environmental conditions.

Simpson Strong-Tie® products are designed to enable structures to resist the movement, stress, and loading that results from impact events such as earthquakes and high velocity winds. Simpson Strong-Tie products are designed to the load capacities and uses listed in this catalog. Properly-installed Simpson Strong-Tie products will perform substantially in accordance with the specifications set forth on the website or in the applicable Simpson Strong-Tie catalog. Additional performance limitations for specific products may be listed on the applicable catalog pages.

Due to the particular characteristics of potential impact events, the specific design and location of the structure, the building

materials used, the quality of construction, and the condition of the soils involved, damage may nonetheless result to a structure and its contents even if the loads resulting from the impact event do not exceed Simpson Strong-Tie® catalog specifications and Simpson Strong-Tie products are properly installed in accordance with applicable building codes.

All warranty obligations of Simpson Strong-Tie Australia Pty Limited shall be limited, at the discretion of Simpson Strong-Tie Australia Pty Limited, to repair or replacement of the defective part. These remedies shall constitute Simpson Strong-Tie Australia Pty Limited's sole obligation and sole remedy of purchaser under this warranty. In no event will Simpson Strong-Tie Australia Pty Limited be responsible for incidental, consequential, or special loss or damage, however caused.

This warranty is expressly in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose, all such other warranties being hereby expressly excluded. This warranty may change periodically – consult our website (www.strongtie.com.au) for current information.

Warning

Simpson Strong-Tie Australia Pty Limited structural connectors, anchors and other products are designed and tested to provide specified design loads. To obtain optimal performance from Simpson Strong-Tie Australia Pty Limited products and achieve maximum allowable design load and design strength, the products must be properly installed and used in accordance with the installation instructions and design limits provided by Simpson Strong-Tie Australia Pty Limited. To ensure proper installation and use, designers and installers must carefully read the following General Notes, General Instructions for the Installer and General Instructions for the Designer as well as consult the applicable catalog pages for specific product installation instructions and notes. If you do not understand the catalog, or if you have any questions, contact Simpson Strong-Tie Australia Pty Limited for further information.

In addition to following all notes, warnings and instructions provided in the catalog, installers, designers, engineers and consumers should consult the Simpson Strong-Tie Australia Pty Limited website at www.strongtie.com.au to obtain additional design and installation information.

Failure to follow fully all of the notes and instructions provided by Simpson Strong-Tie Australia Pty Limited may result in improper design or installation of products. Improperly designed or installed products may not perform to the specifications set forth in this catalog and may reduce a structure's ability to resist the movement, stress and loading that occurs from gravity loads as well as impact events such as earthquakes and high velocity winds.

Simpson Strong-Tie Australia Pty Limited does not guarantee the performance or safety of products that are modified, improperly installed, or not used in accordance with the design and load limits set forth in this catalog.

Important Information and General Notes

This product guide is valid until December 31st, 2014. In an effort to conserve our natural resources and continue to provide our customers with current information on our ever-expanding product line, Simpson Strong-Tie will publish an addendum in calendar years that occur prior to the expiration of content. The addendum, if deemed necessary by Simpson Strong-Tie, will contain new product information, updated testing or technical information, or any other information needed to keep our customers up to date with our product line. The most current information can always be found at www.strongtie.com.au.

Technical Support

When you call for engineering technical support, we can help you if you have the following information at hand. This will help us to serve you promptly and efficiently.

- What Simpson Strong-Tie® catalog are you using? (See the front cover for the form number).
- Which Simpson Strong-Tie product are you considering?
- What are the design requirements? (e.g. loads, anchor diameter, base material, edge/spacing distance, etc.).

For the most up-to-date information about our products, visit our websites at:

www.strongtie.com.au

or

www.strongtie.com.nz

This product guide reflects changes in the loads and configurations of some Simpson Strong-Tie Australia Pty Limited products. This product guide is effective until December 31, 2014, and supersedes all information in all earlier publications, including catalogs, brochures, fliers, technical bulletins, etc. Information on loads and configurations is updated periodically.

Corrosion Information

Understanding The Issues

Metal fasteners and anchors will corrode and may lose load-carrying capacity when installed in corrosive environments or exposed to corrosive materials. There are many environments and materials which may cause corrosion including ocean-salt air, fire retardants, fumes, fertilizers, preservative-treated wood, de-icing salts, dissimilar metals, and other corrosive elements.

The many variables present in a single building environment make it impossible to accurately predict if, or when, significant corrosion will begin or reach a critical level. This relative uncertainty makes it crucial that Designers and users be knowledgeable of the potential risks and select a product coating or metal suitable for the intended use. It is also important that regular maintenance and periodic inspections are performed, especially for outdoor applications.

It is common to see some corrosion especially in outdoor applications. Even stainless steel can corrode. The presence of some corrosion does not mean that load capacity has necessarily been affected or that a failure will occur. If significant corrosion is apparent or suspected, then the wood, anchors and fasteners should be inspected by a qualified professional engineer or qualified general contractor and may need to be replaced.

Preservative-treated wood formulations have changed significantly, and some of the new formulations are more corrosive to anchors and fasteners than the traditionally used formulation of CCA-C. Simpson Strong-Tie testing has shown that ACQ-C, ACQ-D (Carbonate) and CA-B treated woods are approximately two times more corrosive than CCA-C, while SBX-DOT (Sodium Borate) treated woods were shown to be less corrosive than CCA-C. (See technical bulletin T-PTWOOD for details).

Due to the many different preservative-treatment formulations, fluctuating retention levels, moisture content, and because the formulations may vary regionally, or change without warning, understanding which anchors or fasteners to use with these materials has become a complex task. We have attempted to provide basic knowledge on the subject here, but it is important to fully educate yourself by reviewing our technical bulletins on the topic, and also by viewing information and literature provided by others. Additionally, because the issue is evolving it is important to get the very latest information on the topic by visiting our website at www.strongtie.com/info.

Types 304/316 stainless steel are the most effective options to mitigate corrosion risk. However, they are more expensive and sometimes more difficult to obtain. To best serve our customers, Simpson Strong-Tie Company Inc. is evaluating the options to identify the safest and most cost-effective solutions. Based on our testing and experience, there are some specific applications that are appropriate for zinc-plated, mechanically galvanized (Class 55 and 65), hot-dip galvanized, Type 410 stainless steel with a protective top coat, and Type 304/316 stainless-steel anchors or fasteners (see page 7).

Corrosion Information

General Simpson Strong-Tie Recommendations

Outdoor environments are generally more corrosive to steel. If you choose to use mechanically galvanized (Class 55 and 65) on an outdoor project, you should periodically inspect your anchors and fasteners or have a professional inspection performed. Regular maintenance including water-proofing of the wood used in your outdoor project is also a good practice.

For wood with actual retention levels greater than 0.40 pcf for ACQ, 0.34 for MCQ, 0.21 pcf for CA-B, 0.15 pcf for CA-C and MCA or 0.14 pcf for µCA-C (Ground Contact), stainless-steel anchors and fasteners are recommended. Verify actual retention level with the wood treater.

Testing indicates wood installed dry reduces potential corrosion. If dry wood is used, see our website for additional information.

Due to the many variables involved, Simpson Strong-Tie Company Inc. cannot provide estimates on service life of connectors, anchors or fasteners. We suggest that all users and Specifiers also obtain recommendations for mechanically galvanized (Class 55 and 65) or other coatings from the treated-wood supplier for the type of wood used. However, as long as Simpson Strong-Tie Company Inc. recommendations are followed, Simpson Strong-Tie Company Inc. stands behind its product performance and our standard warranty (page 5) applies.

Guidelines for Selecting the Proper Anchor or Fastener Coating/Material

- Evaluate the Application.** Consider the type of connection and how critical it is. These recommendations may not apply to non-structural applications such as fences.
- Evaluate the Environment.** Testing and experience indicate that indoor dry environments are less corrosive than outdoor environments. Determining the type of environment where an anchor or a fastener will be used is an important factor in selecting the most appropriate material and coating for anchor or fastener use. To help in your decision making, consider the following general exposure information:
 - Interior Dry Use:** Includes wall and ceiling cavities, and raised floor applications in enclosed buildings that have been designed to ensure that condensation and other sources of moisture do not develop.
 - Exterior:** Includes outdoor construction in conditions other than Higher Exposure Use.
 - Higher Exposure Use:** Includes exposure to ocean salt air, de-icing salts, fire retardants, large bodies of water (*e.g. dock boards*), fumes, fertilizers, soil, some preservative-treated woods, industrial zones, acid rain, and other corrosive elements.
- Evaluate the material to be fastened.** When fastening most untreated wood and other common building materials, additional corrosion risk caused by the fastened material is not a significant factor. Although when fastening dissimilar metals carefully consider the correct combination of fastener and material necessary to avoid galvanic corrosion. For preservative-treated wood applications, proceed to step four otherwise proceed to step five.
- Familiarize yourself with the preservative-treated wood to be fastened.** The preservative-treated-wood supplier should provide all of the pertinent information about the wood being used. This information should include the specific type of wood treatment used, if ammonia was used in the treatment and the chemical retention level. If this information is not available, then Simpson Strong-Tie Company Inc. recommends the use of types 304 or 316 stainless steel. It is also advisable to obtain a recommendation from the treated-wood supplier for a fastener coating or material that is suitable for use with their formulation in the intended environment. If this recommendation differs from those shown in the table below, Simpson Strong-Tie Company Inc. recommends that the most conservative recommendation be followed.
- Use the chart below, which is based on Simpson Strong-Tie testing and experience, to select the anchor or fastener coating or material.** If the material or preservative-treated wood product to be used is not shown on the chart, Simpson Strong-Tie has not evaluated it and cannot make any other recommendation than the use of coatings/materials shown in the "high" category shown below. Manufacturers may independently provide test results or other product use information; Simpson Strong-Tie Company Inc. expresses no opinion regarding such information.

Minimum Coating or Material Recommendation

Coating/Material Classification

Low – Use Simpson Strong-Tie® zinc plated anchors or fasteners as a minimum.

Med – Use MG (ASTM B695, Class 55 or 65, AS3655.2), HDG or Type 410 stainless steel with a protective top coat as a minimum.

High – Use Type 304 or 316 stainless steel anchors and fasteners as a minimum.

Environment	Material to be Fastened							ACZA	Other or Uncertain
	Untreated Wood or Other Material	Preservative-Treated Wood							
		SBX/DOT & Zinc Borate	MCQ/MCA	ACQ-C, ACQ-D (Carbonate), CA-B, CA-C/µCA-C					
				Without Ammonia	With Ammonia	Higher Chemical Content			
Interior Dry	Low	Low	Low	Med	Med	High	High	High	
Exterior ⁷	Med	N/A ²	Med ^{3,4}	Med ^{3,4}	High	High	High	High	
Higher Exposure ⁷	High	N/A ²	High	High	High	High	High	High	
Uncertain ⁷	High	High ²	High	High	High	High	High	High	

- Wood with actual retention levels greater than 0.40 pcf for ACQ, 0.34 for MCQ, 0.21 pcf for CA-B, 0.15 pcf for CA-C and MCA or 0.14 pcf for µCA-C (Ground Contact), stainless-steel anchors and fasteners are recommended. Verify actual retention level with the wood treater.
- Borate treated woods are not appropriate for outdoor use.
- Test results indicate that hot-dip galvanized and mechanically galvanized (*class 55 and 65*) will perform adequately, subject to regular maintenance and periodic inspection. However, the test protocol followed was a modified version of the nationally recognized test method AWWA E12-94. This test method is an accelerated test, so data over an extended period of time is not available. Also noteworthy is that tests run in a laboratory may not correlate to service conditions. If uncertain, use types 304/316 stainless steel.
- Some treated wood may have excess surface chemicals making it potentially more corrosive. If you suspect this or are uncertain, use types 304/316 stainless steel.
- Ammonia is typically used as a chemical carrier for difficult to treat wood species, such as, but not exclusive to, Douglas Fir and Hem Fir, which are usually found in the western United States. Amine carriers are used in some of the eastern species, such as Southern Yellow Pine. If uncertain, verify chemical with wood treater.
- Type 316 stainless-steel fasteners are the minimum recommendation for ocean-salt air and other chloride environments.
- Mechanically galvanized Titen HD® Anchors are only recommended for temporary exterior applications.

For the latest Simpson Strong-Tie® coating information and additional technical information on this topic, visit our website at www.strongtie.com.au/info.

Important Information and General Notes

General Notes

These general notes are provided to ensure proper installation of Simpson Strong-Tie Australia Pty Limited products and must be followed fully.

- Simpson Strong-Tie Australia Pty Limited reserves the right to change specifications, designs, and models without notice or liability for such changes.
- Unless otherwise noted, dimensions are in inches and loads are in pounds.
- Do not overload, which will jeopardize the anchorage. Service loads shall not exceed published allowable loads. Factored loads shall not exceed design strengths calculated in accordance with published design data.
- Some hardened fasteners may experience premature failure if exposed to moisture. These fasteners are recommended to be used in dry interior applications.
- Do not weld products listed in this catalog. Some steel types have poor weldability and a tendency to crack when welded.

General Instructions for the Installer

These general instructions for the installer are provided to ensure the proper selection and installation of Simpson Strong-Tie Australia Pty Limited products and must be followed carefully. These general instructions are in addition to the specific design and installation instructions and notes provided for each particular product, all of which should be consulted prior to and during the installation of Simpson Strong-Tie Australia Pty Limited products.

- Do not modify Simpson Strong-Tie Australia Pty Limited products. The performance of modified products may be substantially weakened. Simpson Strong-Tie will not warrant or guarantee the performance of such modified products.
- Do not alter installation procedures from those set forth in this catalog.
- Drill holes for mechanical anchors with carbide-tipped drill bits meeting the diameter requirements of ANSI B212.15 shown in the table provided. A properly-sized hole is critical to the performance of mechanical anchors. Rotary-hammer drills with light, high-frequency impact are recommended for drilling holes. When holes are to be drilled in archaic or hollow base materials, the drill should be set to "rotation-only" mode.
- For mechanical anchors that require a specific installation torque: Failure to apply the recommended installation torque can result in excessive displacement of the anchor under load or premature failure of the anchor. These anchors will lose pre-tension after setting due to pre-load relaxation.
- Do not disturb, bolt up, or apply load to adhesive anchors prior to the full cure of the adhesive.
- For powder-actuated fastening, refer to the Important Information on page 61.
- Use proper safety equipment.

Finished Diameters for Rotary and Rotary Hammer Carbide Tipped Concrete Drills per ANSI B212.15

Nominal Drill Bit Diameter (mm)	Tolerance Range Minimum (mm)	Tolerance Range Maximum (mm)
5	5.15	5.40
6	6.15	6.40
7	7.20	7.45
8	8.20	8.45
10	10.20	10.45
11	11.20	11.50
12	12.20	12.50
13	13.20	13.50
14	14.20	14.50
15	15.20	15.50
16	16.20	16.50
18	18.20	18.50
19	19.21	19.55
20	20.21	20.55
22	22.21	22.55
24	24.21	24.55
25	25.21	25.55
28	28.21	28.55
30	30.21	30.55
32	32.25	32.70
34	34.25	34.70
35	35.25	35.70
37	37.25	37.70
40	40.25	40.80
44	44.25	44.80
52	52.30	52.95

Important Information and General Notes

General Instructions for the Designer

These general instructions for the designer are provided to ensure the proper selection and installation of Simpson Strong-Tie Australia Pty Limited products and must be followed carefully. These general instructions are in addition to the specific design and installation instructions and notes provided for each particular product, all of which should be consulted prior to and during the design process.

- a. The term “Designer” used throughout this catalog is intended to mean a licensed/certified building design professional, a licensed professional engineer, or a licensed architect.
- b. All connected members and related elements shall be designed by the Designer and must have sufficient strength (bending, shear, etc) to resist the loads imposed by the anchors.
- c. When the allowable stress design method is used, the design service loads shall not exceed the published allowable loads reduced by load-adjustment factors for temperature, spacing and edge distance as applicable.
- d. When the strength design method is used, reduced by load-adjustment factors for temperature, spacing, and edge distance, as applicable, the factored loads shall not exceed the design strengths calculated in accordance with the published design data.
- e. Simpson Strong-Tie® strongly recommends the following addition to construction drawings and specifications: “Simpson Strong-Tie products are specifically required to meet the structural calculations of plan. Before substituting another brand, confirm load capacity based on reliable published testing data or calculations. The Engineer/Designer of Record should evaluate and give written approval for substitution prior to installation.”
- f. Local and/or regional building codes may require meeting special conditions. Building codes often require special inspections of anchors installed in concrete or masonry. For compliance with these requirements, it is necessary to contact the local and/or regional building authority. Except where mandated by code, Simpson Strong-Tie® products do not require special inspection.
- g. Allowable loads and design strengths are determined from test results, calculations, and experience. These are guide values for sound base materials with known properties. Due to variation in base materials and site conditions, site-specific testing should be conducted if exact performance in a specific base material at a specific site must be known.
- h. Unless stated otherwise, tests conducted to derive performance information were performed in members with minimum thickness equal to 1.5 times the anchor embedment depth. Anchoring into thinner members requires the evaluation and judgment of a qualified Designer.
- i. Tests are conducted with anchors installed perpendicular ($\pm 6^\circ$ from a vertical reference) from a vertical reference to the surface of the base material. Deviations can result in anchor bending stresses and reduce the load carrying capacity of the anchor.
- j. Allowable loads and design strengths do not consider bending stresses due to shear loads applied with large eccentricities.
- k. Metal anchors and fasteners will corrode and may lose load-carrying capacity when installed in corrosive environments or exposed to corrosive materials.
- l. Mechanical anchors should not be installed into concrete that is less than 7 days old. The allowable loads and design strengths of mechanical anchors that are installed into concrete less than 28 days old should be based on the actual compressive strength of the concrete at the time of installation.
- m. Nominal embedment depth (embedment depth) is the distance from the surface of the base material to the installed end of the anchor and is measured prior to application of an installation torque (if applicable). Effective embedment depth is the distance from the surface of the base material to the deepest point at which the load is transferred to the base material.
- n. Drill bits shall meet the diameter requirements of ANSI B212.15.
- o. Threaded-rod inserts for adhesive anchors shall be metric coarse, fully threaded steel.
- p. Allowable loads and design strengths are generally based on testing of adhesive anchors installed into dry holes. For information regarding installation into damp or wet holes, please refer to www.strongtie.com.au/anchorinfo.
- q. Adhesive anchors should not be installed into concrete that is less than 7 days old. The allowable loads and design strengths of adhesive anchors that are installed into concrete less than 28 days old should be based on the actual compressive strength of the concrete at the time load is applied.
- r. Adhesive anchors can be affected by elevated base material temperature.
- s. Anchors are permitted to support fire-resistive construction provided at least one of the following conditions is fulfilled:
 - a) Anchors are used to resist wind or seismic forces only;
 - b) Anchors that support gravity load-bearing structural elements are within a fire-resistance-rated envelope or a fire-resistance-rated membrane, are protected by approved fire-resistance rated materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards;
 - c) Anchors are used to support nonstructural elements.
- t. Some adhesives are not qualified for resisting long-term sustained loads. These adhesives are for resisting short-term loads such as wind or seismic loads only.
- u. Exposure to some chemicals may degrade the bond strength of adhesive anchors. Refer to the product description for chemical resistance information. Information is also available in Simpson Strong-Tie Australia Pty Limited Technical Bulletin T-SAS-CHEMRES.

For more information on these instructions, including *Supplemental Topics for the Designer*, please refer to www.strongtie.com.au/anchorinfo or www.strongtie.com.nz/anchorinfo

Epoxy Anchoring Adhesives

Ideal for anchoring threaded rod, rebar and smooth dowels in a variety of base materials, epoxy-based anchoring adhesives offer strength and versatility across a wide variety of applications. Simpson Strong-Tie[®] epoxy adhesives meet or are rigorously tested to meet IBC requirements for both cracked and uncracked concrete applications. As you would expect, Simpson Strong-Tie offers all the high-strength dispensing tools and other important accessories to increase productivity on any project.



Adhesive Anchoring Installation Instructions

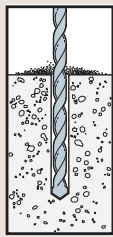


NOTE: Always check expiration date on product label. Do not use expired product.

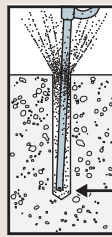


WARNING: When drilling and cleaning hole, use eye and lung protection. When installing adhesive, use eye and skin protection.

1 HOLE PREPARATION: Horizontal, Vertical and Overhead Applications (SET-XP® and ET-HP™ only; for AT-HP™ refer to page 17)

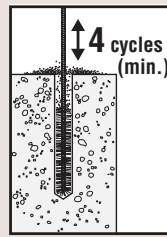


1. Drill—Drill hole to specified diameter and depth.

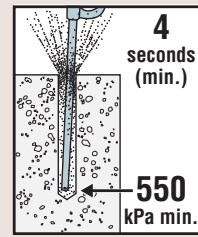


4 seconds (min.)
550 kPa min.

2. Blow—Remove dust from hole with oil-free compressed air for a minimum of 4 seconds. Compressed air nozzle **must** reach the bottom of the hole.



4 cycles (min.)
3. Brush—Clean with a nylon brush for a minimum of 4 cycles. Brush should provide resistance to insertion. If no resistance is felt, the brush is worn and must be replaced.



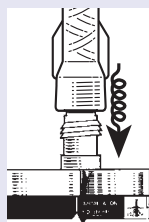
4 seconds (min.)
550 kPa min.
4. Blow—Remove dust from hole with oil-free compressed air for a minimum of 4 seconds. Compressed air nozzle **must** reach the bottom of the hole.

Refer to page 19 or visit www.strongtie.com.au or www.strongtie.com.nz for proper brush part number.

2 CARTRIDGE PREPARATION:

1. Check—Check expiration date on product label. Do not use expired product. Product is usable until end of printed expiration month.

2. Open—Open cartridge per package instructions.

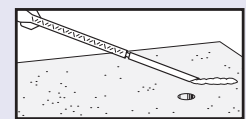


Refer to www.strongtie.com.au or www.strongtie.com.nz for proper mixing nozzle and dispensing tool part number.

3. Attach—Attach proper Simpson Strong-Tie® nozzle and extension to cartridge. Do not modify nozzle.



4. Insert—Insert cartridge into dispensing tool.

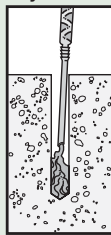


5. Dispense—Dispense adhesive to the side until properly mixed (uniform color).

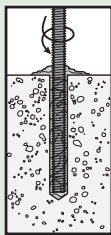
3 FILLING THE HOLE: Vertical Anchorage

Prepare the hole per instructions “Hole Preparation” on product label.

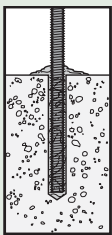
Dry and Damp Holes*:



1. Fill—Fill hole 1/2–3/4 full, starting from bottom of hole to prevent air pockets. Withdraw nozzle as hole fills up.



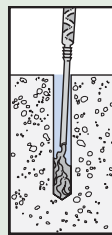
2. Insert—Insert clean, oil free anchor, turning slowly until the anchor contacts the bottom of the hole.



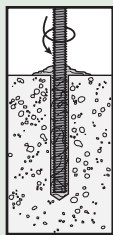
3. Do not disturb—Do not disturb anchor until fully cured. (See cure schedule for specific adhesive.)

Threaded rod or rebar

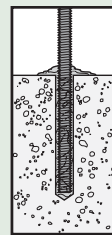
Water-Filled



1. Fill—Fill hole completely full, starting from bottom of hole to prevent water pockets. Withdraw nozzle as hole fills up.



2. Insert—Insert clean, oil-free anchor, turning slowly until the anchor contacts the bottom of the hole.



3. Do not disturb—Do not disturb anchor until fully cured. (See cure schedule.)

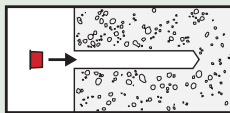
Threaded rod or rebar

*AT-HP™ suitable for “Dry” applications only.

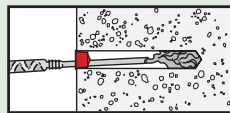
Note: Nozzle extensions may be needed for deep holes.

FILLING THE HOLE: Horizontal and Overhead Anchorage

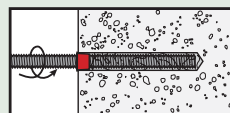
Prepare the hole per instructions “Hole Preparation” on product label.



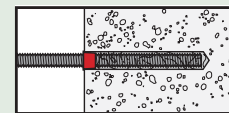
1. Install—Install Simpson Strong-Tie® ARC adhesive retaining cap. Visit www.strongtie.com.au for proper ARC size.



2. Fill—Fill hole 1/2–3/4 full, starting from bottom of hole to prevent air pockets. Withdraw nozzle as hole fills up.



3. Insert—Insert clean, oil-free anchor, turning slowly until the anchor contacts the bottom of the hole.



4. Do not disturb—Do not disturb anchor until fully cured (see cure schedule).

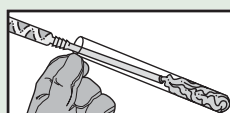
Threaded rod or rebar

Threaded rod or rebar

Note: Nozzle extensions may be needed for deep holes.

FILLING THE HOLE: When Anchoring with Screens: For ET-HP™ Anchoring Adhesive

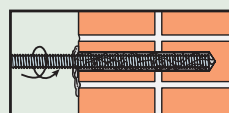
Prepare the hole per instructions “Hole Preparation”.



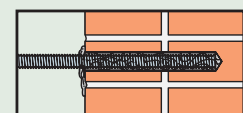
1. Fill—Fill screen completely. Fill from the bottom of the screen and withdraw the nozzle as the screen fills to prevent air pockets. (Opti-Mesh® screens: Close integral cap after filling.)



2. Insert—Insert adhesive filled screen into hole.



3. Insert—Insert clean, oil-free anchor, turning slowly until the anchor contacts the bottom of the screen.



4. Do not disturb—Do not disturb anchor until fully cured. (See cure schedule for specific adhesive.)

SET-XP® High-Strength Anchoring Adhesive for Cracked and Uncracked Concrete

SET-XP® is a 1:1 two-component, high-solids, epoxy-based anchoring adhesive formulated for optimum performance in both cracked and uncracked concrete. SET-XP® adhesive has been rigorously tested in accordance with ICC-ES AC308 and 2009 IBC requirements and has proven to offer increased reliability in the most adverse conditions, including performance in cracked concrete under static and seismic loading. SET-XP® adhesive is teal in color in order to be identified as a high-performance adhesive for adverse conditions. Resin and hardener are dispensed and mixed simultaneously through the mixing nozzle. SET-XP® adhesive exceeds the ASTM C881 specification for Type I and Type IV, Grade 3, Class C epoxy.

USES:

- Threaded rod anchoring in cracked and non-cracked concrete
- Rebar dowelling in cracked and non-cracked concrete
- Bonding hardened concrete to hardened concrete
- Pick-proof sealant around doors, windows and fixtures
- Paste-over for crack injection

CODES: ETA-11-0360; ICC-ES ESR-2508; NSF/ANSI Standard 61.

APPLICATION: Surfaces to receive epoxy must be clean. The base-material temperature must be 10°C or above at the time of installation. For best results, material should be 20–26°C at the time of application. Cartridges should not be immersed in water to facilitate warming. To warm cold material, the cartridges should be stored in a warm, uniformly-heated area or storage container for a sufficient time to allow epoxy to warm completely. Mixed material in nozzle can harden in 5–7 minutes at a temperature of 5°C or above.

INSTALLATION: See page 11

SHELF LIFE: 24 months from date of manufacture in unopened side-by-side cartridge.

STORAGE CONDITIONS: For best results, store between 7°C – 32°C. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle.

COLOR: Resin – white, hardener – black-green. When properly mixed, SET-XP adhesive will be a uniform teal color.

CLEAN UP: Uncured material – Wipe up with cotton cloths. If desired, scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner or adhesive remover can be used. **DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN.** Take appropriate precautions when handling flammable solvents. Solvents may damage surfaces to which they are applied. Cured Material – chip or grind off surface.

TEST CRITERIA: Anchors installed with SET-XP® adhesive have been tested in accordance with ICC-ES's Acceptance Criteria for Post-Installed Adhesive Anchors in Masonry Elements (AC508) and Adhesive Anchors in Concrete Elements (AC308) for the following:

- Seismic and wind loading in cracked and uncracked concrete and uncracked masonry
- Static loading at elevated-temperatures
- Static tension and shear loading in cracked and uncracked concrete and uncracked masonry
- Damp holes
- Horizontal and overhead installations
- Freeze-thaw conditions
- Long-term creep at elevated-temperatures
- Critical and minimum edge distance and spacing

PROPERTY	TEST METHOD	RESULTS
Consistency	ASTM C881	Passed, non-sag
Glass transition temperature	ASTM E1356	68°C
Bond strength (moist cure)	ASTM C882	25.8 MPa at 2 days
Water absorption	ASTM D570	0.10%
Compressive yield strength	ASTM D695	102 MPa
Compressive modulus	ASTM D695	4,440 MPa
Gel time	ASTM C881	49 minutes

CHEMICAL RESISTANCE: Very good to excellent against distilled water, in-organic acids and alkalis. Fair to good against organic acids and alkalis, and many organic solvents. Poor against ketones. For more detailed information visit our website or contact Simpson Strong-Tie.

ACCESSORIES: See pages 18–22 for information on dispensing tools, mixing nozzles and other accessories.



SET-XP®



SET-XP Cartridge System

Model No.	Capacity ml (ounces)	Cartridge Type	Carton Quantity	Dispensing tool(s)	Mixing Nozzle
SET-XP22	650 (22)	side-by-side	10	EDT22S EDTA22P EDT22CKT	EMN22i

Use only appropriate Simpson Strong-Tie mixing nozzle in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair epoxy performance.

Cure Schedule

Base Material Temperature °C	Gel Time (mins.)	Cure Time (hrs.)
10	75	72
16	60	48
21	45	24
32	35	24
43	20	24

For water-saturated concrete, the cure times are doubled.

IMPORTANT – See Page 11 for Installation Instructions

ET-HP™ Anchoring Adhesive

ET-HP™ is a two-component, high solids, epoxy-based system for use as a high-strength, non-shrink anchor grouting material. Resin and hardener are dispensed and mixed simultaneously through the mixing nozzle. ET-HP meets the ASTM C-881 specifications for Type I, II, IV and V, Grade 3, Classes B and C, except gel time.

- USES:**
- Threaded rod anchoring
 - Rebar doweling
 - Bonding hardened concrete to hardened concrete
 - Pick-proof sealant around doors, windows and fixtures
 - Paste-over for crack injection

CODES: ICC-ES ER-4945 (URM)

⚠ The load tables list values based upon results from the most recent testing and may not reflect those in current code reports. Where code jurisdictions apply, consult the current reports for applicable load values.

APPLICATION: Surfaces to receive epoxy must be clean. For installations in or through standing water, see page 11 for details. The base material temperature must be 5°C or above at the time of installation. For best results, material should be 20–26°C at the time of application. Cartridges should not be immersed in water to facilitate warming. To warm cold material, the cartridges should be stored in a warm, uniformly heated area or storage container for a sufficient time to allow epoxy to warm completely. Mixed material in nozzle can harden in 5–7 minutes at a temperature of 5°C or above.

INSTALLATION: See page 11

SHELF LIFE: 24 months from date of manufacture in unopened container

STORAGE CONDITIONS: For best results store between 7°C – 32°C. To store partially used cartridges, leave hardened nozzle in place. To re-use, attach new nozzle.

COLOR: Resin – white, hardener – black. When properly mixed, ET-HP adhesive will be a uniform medium gray color.

CLEAN UP: Uncured material — Wipe up with cotton cloths. If desired scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner, or adhesive remover can be used. **DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN.** Take appropriate precautions when handling flammable solvents. Solvents may damage surfaces to which they are applied. Cured material: Chip or grind off surface.

TEST CRITERIA: Anchors installed with ET-HP™ adhesive have been tested in accordance with ICC-ES's *Acceptance Criteria for Adhesive Anchors in Masonry Elements (AC58)* and *Adhesive Anchors in Concrete Elements (AC308)*.

In addition, anchors installed with ET-HP adhesive have been tested in accordance with ICC-ES's *Acceptance Criteria for Unreinforced Masonry Anchors (AC60)*.

PROPERTY	TEST METHOD	RESULTS
Bond Strength Moist Cure	ASTM C 882	14 MPa (2 days) 29 MPa (14 days)
Compressive Yield Strength	ASTM D 695	63 MPa (24 hours) 92 MPa (7 days)
Consistency (25°C)	ASTM C 881	Non-Sag Thixotropic Paste
Water Absorption	ASTM D 570	0.19% (24 hours)
Compressive Modulus	ASTM D 695	4535 MPa (7days)
Heat Deflection	ASTM D 648	76°C
Gel Time (25°C)	ASTM C 881	30 Minutes (thin film)

CHEMICAL RESISTANCE Very good to excellent against distilled water, inorganic acids and alkalis. Fair to good against organic acids and alkalis, and many organic solvents. Poor against ketones. For more detailed information, visit www.strongtie.com.

ACCESSORIES: See pages 18–22 for information on dispensing tools, mixing nozzles and other accessories.



ET-HP™



EMN22i

EDT22S

ET-HP Cartridge Systems

Model No.	Capacity ml (ounces)	Cartridge Type	Carton Quantity	Dispensing Tool(s)	Mixing4 Nozzle
ET-HP22	650 (22)	side-by-side	10	EDT22S EDTA22P EDTA22CKT	EMN22i

Use only appropriate Simpson Strong-Tie® mixing nozzle in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair epoxy performance.

Cure Schedule

Base Material Temperature	Cure Time
°C	
4	72 hrs.
16	24 hrs.
27	24 hrs.
38	12 hrs.

In-Service Temperature Sensitivity

Base Material Temperature	Percent Allowable Load
°C	
4	100%
21	100%
43	100%
57	85%
66	69%
82	58%

IMPORTANT – See Page 11 for Installation Instructions

Estimating Guides for SET-XP® and ET-HP™ Adhesives

Estimating Guide for 650 ml Cartridge using Threaded Rod – Installations per Cartridge

Rod Dia. (mm)	Drill Bit Dia. (mm)	Threaded Rod in Solid Base Material Hole Depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
10	12	110	73	55	44	37	31	27	24	22	20	18	17	16	15	14	13	12	12	11
12	14	126	84	63	51	42	36	32	28	25	23	21	19	18	17	16	15	14	13	13
16	18	62	42	31	25	21	18	16	14	12	11	10	10	9	8	8	7	7	7	6
20	22	30	20	15	12	10	9	8	7	6	5	5	5	4	4	4	4	3	3	3
22	25	42	28	21	17	14	12	11	9	8	8	7	6	6	6	5	5	5	4	4
22	29	25	17	13	10	8	7	6	6	5	5	4	4	4	3	3	3	3	3	3
25	29	35	23	17	14	12	10	9	8	7	6	6	5	5	5	4	4	4	4	3
29	32	30	20	15	12	10	9	7	7	6	5	5	5	4	4	4	4	3	3	3
32	35	27	18	13	11	9	8	7	6	5	5	4	4	4	4	3	3	3	3	3
32	38	17	12	9	7	6	5	4	4	3	3	3	3	2	2	2	2	2	2	2

Tables are estimations. Actual usage may vary depending on waste.

Estimating Guide for 650 ml Cartridge using Rebar – Installations per Cartridge

Rebar Size (mm)	Drill Bit Dia. (mm)	Rebar in Solid Base Material Hole Depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
10	12	131	87	65	52	44	37	33	29	26	24	22	20	19	17	16	15	15	14	13
12	14	192	128	96	77	64	55	48	43	38	35	32	30	27	26	24	23	21	20	19
16	20	65	44	33	26	22	19	16	15	13	12	11	10	9	9	8	8	7	7	7
20	22	57	38	29	23	19	16	14	13	11	10	10	9	8	8	7	7	6	6	6
25	29	49	33	25	20	16	14	12	11	10	9	8	8	7	7	6	6	5	5	5
28	32	44	29	22	18	15	13	11	10	9	8	7	7	6	6	6	5	5	5	4
32	38	23	16	12	9	8	7	6	5	5	4	4	4	3	3	3	3	3	2	2
39	48	11	7	6	4	4	3	3	2	2	2	2	2	2	1	1	1	1	1	1

Tables are estimations. Actual usage may vary depending on waste.

Estimating Guide for 650 ml Cartridge and Plastic Screen Tubes – Installations per Cartridge – ET-HP™ Only

Rod Dia. (mm)	Drill Bit Dia. (mm)	Threaded Rod Inserted in Screen Tube Hole Depth (mm)																		
		75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500	525
10	14	57	50	40	34	29	25	22	20											
12	16	30	26	21	17	15	13	12	10											
16	22	20	18	14	12	10	9	8	7	6	6	5								
19	25	15	13	10	9	7	6	6	5	5	4	4	4	3	3	3	3	3	3	2

Tables are estimations. Actual usage may vary depending on waste.

Acrylic Anchoring Adhesive



Simpson Strong-Tie[®] acrylic anchoring adhesive delivers consistent performance for high-strength anchor grouting in a wide range of weather conditions. Our acrylic formulation cures fast, even at 0°C, and is available in multiple cartridge sizes to suit most jobsite applications. A complete line of preparatory accessories, dispensing tools and static mixing nozzles are available to maximize jobsite efficiency.



AT-HP™ Anchoring Adhesive

AT-HP is a styrene-free methacrylate resin suitable for high performance fixing applications of threaded rod and rebar into concrete. Easy to dispense and fast curing, specially designed for structural fixings and very technical construction sites. Applications for metallic racking or for work in reinforced concrete.

Multiple cartridge sizes are available to satisfy various trades, applications, and job conditions. The coaxial 280 ml cartridge easily dispenses with a standard caulking gun, while the 380 and 825 ml dual cartridge systems utilize the DT380 and ADT30S respectively.

- USES:**
- Threaded rod and rebar connections
 - Racking
 - Balconies
 - Facade

CODES: European Technical Approval : ETA-11/0139, ETA-11/0150 & ETA-11/0151

APPLICATION: Surfaces to receive adhesive must be clean. The base material temperature must be 0°C or above at the time of installation. For best results, material should be 20-26°C at the time of application. Cartridges should not be immersed in water to facilitate warming. To warm cold material, the cartridges should be stored in a warm, uniformly heated area or storage container for a sufficient time to allow epoxy to warm completely. Mixed material in nozzle can harden in 1-2 minutes at a temperature of 5°C or above.

INSTALLATION: Refer to page 17

SHELF LIFE: 12 months

STORAGE CONDITIONS: For best results store between 0–26°C. Partially used cartridges can be stored for a limited time by leaving nozzle in place. To re-use, attach new nozzle.

COLOR: Gray

CLEAN-UP: Uncured material – Wipe up with cotton clothes. If desired scrub area with abrasive, water based cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner or adhesive remover can be used. **DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN.** Take appropriate precautions when handling flammable solvents. Solvents can damage the surfaces to which they are applied. Cured material – chip or grind off surface

TEST CRITERIA: European Technical Approval Option 8

ACCESSORIES: See pages 18–22 for information on dispensing tools, mixing nozzles and other accessories.



AT-HP™
380 ml



DT380



MN1

AT-HP™ Cartridge System

Model No.	Capacity ml (ounces)	Carton Quantity	Dispensing Tool(s)	Mixing Nozzle
AT-HP280	280 (9.6)	12	CDT10 or Standard Caulking Gun	MN1
AT-HP380	380 (12.5)	10	DT380	MN1
AT-HP825	825 (30)	5	ADT30S	MN1

Use only appropriate Simpson Strong-Tie mixing nozzle in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair epoxy performance.

Cure Schedule

Base Material Temperature °C	Gel Time (mins.)	Cure Time (mins.)
0	45	150
10	10	105
20	6	50
30	.5	30

Estimating Guides for AT-HP™ Adhesive

INSTALLATION INSTRUCTION:



1. Drill hole to specified diameter and embedment depth



2. Clean by brushing and blowing alternately: 3 blows, 2 brushings.



3. Inject the resin. We strongly recommend to use the extrusion tool from Simpson Strong-Tie® range. Fill the hole 1/2 - 3/4 full, starting from bottom of hole to prevent air pockets. Withdraw nozzle as hole fills up.



4. Insert clean, oil-free anchor/threaded rod, turning slowly until the anchor/threaded rod reaches the bottom of the hole.



5. During setting time you can manipulate anchor/threaded rod and/or add the resin.

Estimating Guide for 380 ml Cartridge Using Threaded Rod – Installation Per Cartridge

Rod Dia (mm)	Drill Bit Dia. (mm)	Threaded rod in solid base material																		
		Hole depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
10	12	102	68	51	41	34	29	25	23	20	18	17	16	15	14	13	12	11	11	10
12	14	74	49	37	30	25	21	18	16	15	13	12	12	11	9	9	9	8	8	7
16	20	36	24	18	15	12	10	9	8	7	6	6	6	5	5	5	4	4	4	4
20	22	29	20	15	12	10	9	7	6	6	5	5	5	4	4	4	3	3	3	3
24	27	28	19	14	12	9	8	7	6	6	5	5	4	4	4	3	3	3	3	3
30	32	18	12	9	7	6	5	4	4	3	3	3	3	3	2	2	2	2	2	2
32	35	16	11	8	6	5	5	4	3	3	3	3	3	2	2	2	2	2	2	2

Table are estimations. Actual usage may vary depending on waste.

Estimating Guide for 380 ml Cartridge Using Rebar – Installation Per Cartridge

Rebar size (mm)	Drill Bit Dia. (mm)	Threaded rod in solid base material																		
		Hole depth (mm)																		
		50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	425	450	475	500
10	12	112	75	56	45	37	32	28	25	22	21	19	17	16	15	14	13	12	12	11
12	14	76	51	38	30	25	22	19	17	15	14	13	12	11	10	9	9	9	8	8
16	20	48	32	24	19	16	14	12	11	9	9	8	7	7	6	6	6	5	5	5
20	22	38	26	19	15	13	11	9	9	8	7	6	6	6	5	5	5	4	4	4
25	30	29	19	14	12	9	8	7	6	6	5	5	4	4	4	3	3	3	3	3
32	35	26	17	13	10	9	7	6	6	5	5	4	4	4	3	3	3	3	3	3
35	40	13	9	6	5	4	4	3	3	3	3	2	2	2	2	2	2	1	1	1

Table are estimations. Actual usage may vary depending on waste.

Adhesive Accessories

Adhesive Dispensing Tools

Our heavy-duty tools are designed to work with our cartridges for trouble-free dispensing. Each manual tool provides a 26:1 drive mechanism for easier dispensing of high-viscosity adhesive.

Epoxy Adhesive Dispensing Tools

EDT22S

Manual Dispensing Tool for 650 ml Adhesive Cartridges

The EDT22S epoxy adhesive tool features a steel carriage and is engineered for high-volume, continuous use. The tool can be easily convert from dispensing a 650 ml 1:1 ratio cartridge to a 16.5 oz. 2:1 ratio cartridge.



EDT22S

EDTA22P

Pneumatic Dispensing Tool for 650 ml Cartridges

The EDTA22P tool features an optional suitcase handle adapter for the ultimate in tool configuration and dispensing convenience. The suitcase option enables easier and time-saving ground-level doweling. The heavy-duty tool comes with a custom, blow-molded plastic carrying case.



EDTA22P

Description	Model No.
Manual tool for 650 ml cartridges	EDT22S
Pneumatic tool for 650 ml cartridges ^{1, 2}	EDTA22P

1. Air supply attachment is ¼-18 NPT (male) thread.
2. Recommended operating air pressure is between 550–827 kPa.

Acrylic Adhesive Dispensing Tools

CDT10S

Manual Dispensing Tool for AT-HP™ 280 ml Adhesive and other Single Cartridge Adhesives

The CDT10S features a steel carriage for ultimate durability and is engineered for continuous, high-volume use. The CDT10S also features double-gripping plates that help extend tool life.



CDT10S

DT380

Manual Dispensing Tool for 380 ml Cartridges

The DT380 features a steel carriage for ultimate durability. The DT380 also features double-gripping plates that help extend tool life.



DT380

ADT30S

Manual Dispensing Tool for 825 ml Adhesive Cartridges

The ADT30S features a steel carriage for ultimate durability and is engineered for continuous, high-volume use. The ADT30S also features double-gripping plates that help extend tool life.



ADT30S

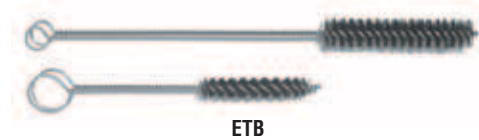
Description	Model No.
Premium tool for single-tube cartridges	CDT10S
Manual tool for 380 ml cartridges	ADT813S
Manual tool for 825 ml cartridges	ADT30S

Adhesive Accessories

Hole Cleaning Brushes

Brushes are used for cleaning drilled holes prior to adhesive anchor installation. Brushes have a twisted wire handle with nylon bristles.

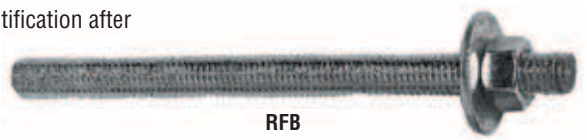
Description	Model No.	For Hole Diameter (mm)	Ctn Qty
19 mm x 101.6 mm brush (40.6 cm total length)	ETB6	16 – 18	24
25.4 mm x 101.6 mm brush (40.6 cm total length)	ETB8	20 – 24	24
31.8 mm x 101.6 mm brush (73.7 cm total length)	ETB10	25 – 28	24
41.3 mm x 152.4 mm brush (86.4 cm total length)	ETB12	32	24



ETB

RFB Threaded Stud with hex head, hex nut and washer

RFBs are pre-cut threaded rod, supplied with nut and washer. For use with Simpson Strong-Tie® adhesives. May be ordered in bulk without the nut and washer. Use with Simpson Strong-Tie adhesives to anchor into existing concrete and masonry. Offers a complete engineered anchoring system when used with Simpson Strong-Tie anchoring adhesives. Each end of the threaded rod is stamped with rod length in inches and our “No-Equal” symbol for easy identification after installation.

RFB
Retrofit Bolts

RFB Hot Dipped Galvanised

Material: Grade 5.8 carbon steel, 1 setting tool included in each box

Type	Diameter	Length	Box Quantity
	(mm)	(mm)	(pcs)
RFB10X130HDG	M10	130	40
RFB12X160HDG	M12	160	25
RFB12X200HDG	M12	200	20
RFB16X190HDG	M16	190	10
RFB16X230HDG	M16	230	10
RFB20X260HDG	M20	260	10

Any size available by special order, please contact Simpson Strong-Tie.

RFB Stainless steel

Material: A4 Stainless steel, 1 setting tool included in each box

Type	Diameter	Length	Box Quantity
	(mm)	(mm)	(pcs)
RFB10x130A4	M10	130	40
RFB12X160A4	M12	160	25
RFB12X200A4	M12	200	20
RFB16X190A4	M16	190	10
RFB16X230A4	M16	230	10
RFB20X260A4	M20	260	10

Any size available by special order, please contact Simpson Strong-Tie.

Adhesive Accessories

Blow-Out Pump For Hole Cleaning

Manual blow pump ideal for cleaning dust from drilled holes prior to applying AT-HP™ anchoring adhesive or installing mechanical anchors.

Model No.	Pkg. Qty.	Ctn Qty.
PUMP	1	4



Mixing Nozzles and Retaining Nuts

Mixing nozzles are designed for the proper proportioning and mixing of the different adhesive formulations. Use only appropriate Simpson Strong-Tie mixing nozzle in accordance with Simpson Strong-Tie instructions. Modification or improper use of the mixing nozzle may impair epoxy or acrylic performance.

EMN22i – An 18-element mixing nozzle for use with 650 ml epoxy adhesives cartridges. This is a one-piece nozzle with integrated nut (separate retaining nut not required).

EMN37A – An 18-element, high-strength, mixing nozzle for dispensing epoxy adhesive through bulk metering equipment.

MN1 – An 18-element, graduated mixing nozzle for use with all AT-HP™ cartridges. This is a one-piece nozzle with integrated nut (separate retaining nut not required).



EMN22i



EMN37A



MN1


Description	Model No.	Pkg Qty	Ctn Qty
18-element nozzle for 650 ml and epoxy adhesive. Features an integrated threaded nut for attachment to cartridges.	EMN22i	1	12 Nozzles
	EMN22i-RP5	5	6 Packs (5 nozzles per pack)
	EMN22i-RP10	10	3 Packs (10 nozzles per pack)
	EMN22iB	—	500
18-element, graduated mixing nozzle with integrated nut for all AT-HP™ cartridges.	MN1-RP10	10	3 Packs (10 nozzles per pack)

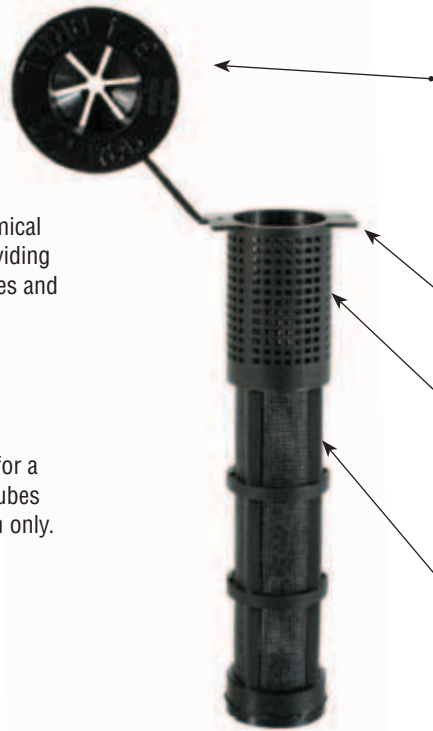
Adhesive Accessories

Opti-Mesh® Adhesive-Anchoring Screen Tubes

Screen tubes are vital to the performance of adhesive anchors in base materials that are hollow or contain voids, such as hollow block and brick. The Simpson Strong-Tie® Opti-Mesh® screen tube provides the economical advantage of a plastic screen tube while providing performance comparable to steel screen tubes and better than competitive plastic screen tubes.

MATERIAL: Plastic

 **CAUTION:** Screen tubes are designed for a specific adhesive type. Epoxy screen tubes must be used with ET-HP™ formulation only.



Integral Cap: Serves to center and secure the rod in the screen tube, while displaying important information such as rod diameter, drill bit diameter and the Simpson Strong-Tie® "S" sign for easy inspection after installation. The cap also prevents adhesive from running out of the front of the screen tube.

Flanges: Prevents the screen tube from slipping into over-drilled holes. Allows screen tube to function in holes that are drilled too deep.

Open-Mesh Collar: This section of larger mesh allows extra adhesive to flow out of the screen tube behind the face shell of hollow block applications. The extra "collar" of adhesive increases bearing area and results in higher load capacities in hollow concrete block.

Color-Coded, Formula-Specific Mesh: The screen tube mesh is sized to allow only the right amount of adhesive to flow through the screen tube to bond with the base material while the balance remains in the screen to bond the rod. The acrylic screen tube mesh is white while the epoxy screen tube mesh is black.

Epoxy Screen Tube
(mesh is black)

U.S. Patent
6,837,018

ET-HP Screen Tubes - Plastic

For Rod Dia. (in)	Hole Size (in)	Length (in)	Model No.	Carton Qty.
3/8	9/16	3 1/2	ETS373P	150
		6	ETS376P	150
		10	ETS3710P	100
1/2	3/4	3 1/2	ETS503P	100
		6	ETS506P	100
		10	ETS5010P	50
5/8	7/8	3 1/2	ETS623P	50
		6	ETS626P	50
		10	ETS6210P	25
		13	ETS6213P	25
3/4	1	8	ETS758P	25
		13	ETS7513P	25
		17	ETS7517P	25
		21	ETS7521P	25



The photo on the left shows the Opti-Mesh® screen tube installed in a hollow CMU block. The extra collar of adhesive created by the open-mesh collar results in increased bearing area and higher load values. The typical screen tube shown on the right relies on the bond between the relatively small amount of adhesive in contact with the face shell of the block for its holding power.

Adhesive Accessories

Steel Adhesive-Anchoring Screen Tubes

Screen tubes are used in hollow base material applications to contain adhesive around the anchor and prevent it from running into voids. Simpson Strong-Tie® screen tubes are specifically designed to work with ET-HP™ adhesive in order to precisely control the amount of adhesive that passes through the mesh. This results in thorough coating and bonding of the rod to the screen tube and base material. Order screen tubes based upon rod diameter.

Note: The actual outside diameter of the screen tube is larger than the rod diameter.

MATERIAL: 60 mesh carbon steel.



CAUTION: Screen tubes are designed for a specific adhesive type. Epoxy screen tubes must be used with ET-HP™ formulation only.



Epoxy Adhesive Screen Tube

Screen tubes are for use in hollow CMU, hollow brick and unreinforced masonry applications.

Contact Simpson Strong-Tie for information on special order sizes.

ET-HP Screen Tubes – Carbon Steel

For Rod Dia. (in.)	Hole Size (in.)	Actual Screen Size O.D./Length (in.)	Model No.	Carton Qty.
3/8	9/16	15/32 x 6	ETS376	150
		15/32 x 10	ETS3710	100
1/2	11/16	19/32 x 6	ETS506	100
		19/32 x 10	ETS5010	50
5/8	7/8	25/32 x 6	ETS626	50
		25/32 x 10	ETS6210	25
		25/32 x 13	ETS6213	25
3/4	1	29/32 x 8	ETS758	25
		29/32 x 13	ETS7513	25
		29/32 x 17	ETS7517	25
		29/32 x 21	ETS7521	25

Adhesive Troubleshooting Guide

PROBLEM	CAUSE	SOLUTION
1) Material not flowing through nozzle.	Gelled or hardened adhesive in nozzle. Adhesive can harden in the nozzle at 21°C in about 5–7 minutes. As the air temperature increases, gel time is shorter.	Replace mixing nozzle.
	Too cold for adhesive to flow.	Keep Material in heated storage area: Store epoxy at 7°– 32°C; Store acrylic at 0–26°C.
	Surface is crusting.	Remove nozzle, dispense small amount of material, then replace nozzle.
	Obstruction in nozzle or on outlet of cartridge.	Change to new nozzle or remove obstruction from cartridge outlet.
	Insufficient air pressure to the pneumatic tool.	Set air pressure at 550–827 kPa
2) Leakage from front of threaded section of cartridge.	Nozzle coupling nut is cross-threaded.	Remove coupling nut and reattach, taking care not to cross-thread.
	Cracked or punctured cartridge.	Do not attempt to dispense damaged cartridge.
3) Material leaking from back of cartridge during dispensing.	Excessive pressure resulting in swelling of cartridge or misalignment of retaining wiper.	Regulate air pressure on pneumatic tool.
		Do not overdrive manual tool.
		See problem 1 to find out why material is not flowing.
	Misalignment of tool push rods and cartridge.	Adjust/repair dispensing tool.
	Misalignment of cartridge.	Make sure cartridge is inserted correctly.
4) Resin (white) getting into hardener (black) chamber or vice versa.	Excessive pressure.	Regulate air pressure on pneumatic tool.
		Do not overdrive manual tool.
		Check to see mixing nozzle is not filled with gelled or hardened epoxy.
		Make sure one of the cartridges is not leaking out of the bottom (refer to problem 3).
5) Hardener (black) only being dispensed or mixture is too dark.	Adhesive too cold to flow and mix properly.	Keep material in heated storage area: Store epoxy at 7°– 32°C; Store acrylic at 0–26°C.
6) Adhesive won't harden in hole.	Adhesive not mixed thoroughly.	Abandon hole and drill new hole. If not possible, call Simpson Strong-Tie.
		Make sure wipers on cartridge are equalized prior to dispensing and adhesive being dispensed is a uniform color before filling holes. Attach nozzle and dispense adhesive to the side until properly mixed (uniform color).
	Base material too cold for epoxy being used.	Allow more time for epoxy to cure.
Use AT-HP™ acrylic adhesive when base material temperature is below 5°C.		

Crack-Repair Adhesive Systems



A proud, old hospital was crumbling. Since its construction in the early 1900s, the ravages of time and seismic activity had left hundreds of cracks that threatened to undermine the structural health of the facility. Utilizing crack repair adhesive systems from Simpson Strong-Tie helped to repair and contribute to the structural integrity of the building – ultimately extending the life of the hospital.

Simpson Strong-Tie offers reliable, easy-to-dispense products for a variety of restoration applications, including structural restoration, pick-proof sealing and water-intrusion prevention.



ETI Injection Epoxy

ETI injection epoxies are specially designed formulations for the injection of cracks in concrete. ETI epoxies are two-component, high-solids formulations. They are available in side-by-side cartridges and are dispensed through a static mixing nozzle using a standard dispensing tool. ETI is available in three viscosities: ETI-LV (low viscosity), ETI-GV (gel viscosity) and ETI-SLV (super-low viscosity) to handle a wide range of crack widths. Properly installed, they provide a repair that is both waterproof and high strength (structural).

FEATURES:

- Chemically bonds with the concrete to provide a structural repair (meets the requirements of ASTM C-881 as a structural repair epoxy)
- Seals the crack from moisture, protecting rebar in the concrete from corrosion and flooring from moisture damage
- All viscosities formulated for maximum penetration under pressure
- Side-by-side cartridge dispensing provides reliable mixing and ratio control when used with the Opti-Mix® static mixing nozzle
- Eliminates the need for expensive bulk dispensing equipment
- Suitable for pressure injection or gravity-feed applications
- Non-shrink material resistant to oils, salts and mild chemicals

ETI-SLV Super-Low Viscosity Injection Epoxy

- Super-low viscosity (350cps) for repair of hairline cracks and cracks up to 6 mm
- Penetrates the smallest cracks
- Suitable for structural repairs

ETI-LV Low Viscosity Injection Epoxy

- Low viscosity epoxy (1790 cps) for repair of fine to medium width cracks 0.4–6.4 mm in width
- Low surface tension allows the material to effectively penetrate narrow cracks
- Suitable for structural repairs

ETI-GV Gel Viscosity Injection Epoxy

- Gel viscosity epoxy for repair of medium cracks 2.4–6.4 mm in width.
- Decreases in viscosity under pressure for increased flowability.
- Suitable for structural repairs.

APPLICATION: Injection epoxies are suitable for repairing non-moving cracks in concrete walls, floors, slabs, columns and beams. They can be used to inject cracks in damp or wet conditions (water cannot be flowing out of crack) with excellent results. Apply to concrete 5°C or above. For best results, warm material to 15°C or above prior to application.

SHELF LIFE: 24 months in unopened cartridge

STORAGE CONDITIONS: For best results, store between 5°– 35°C

CURED: ETI-SLV, ETI-LV: Black, ETI-GV: Gray

CLEAN UP: Removal of cured adhesive – Chip or grind off surface. Uncured Adhesive – Wipe up with cotton cloths. If desired, scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner, or adhesive remover can be used. **DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN.** Take appropriate precautions when handling flammable solvents. Solvents may damage surface to which they are applied.

TECHNICAL SPECIFICATIONS:

- **ETI-SLV:** Meets the requirements of ASTM C-881 Type I, and IV, Grade 1, Classes B & C.
- **ETI-LV:** Meets the requirements of ASTM C-881 Type I, II, IV and V, Grade 1, Classes B & C. Approved under NSF/ANSI Standard 61.
- **ETI-GV:** Meets the requirements of ASTM C-881 Type I, II, IV and V, Grade 3, Classes B & C.

CHEMICAL RESISTANCE: Very good to excellent against distilled water, inorganic acids and alkalis. Fair to good against organic acids and alkalis, and many organic solvents. Poor against ketones.

ACCESSORIES: See page 29 for information on mixing nozzles, parts, fittings and paste over material.



ETI-LV

ETI-GV

ETI-SLV



Caution – The ETI-LV must be used with the Opti-Mix® nozzle (EMN022) for proper mixing. ETI-GV may also be used with the EMN22i mixing nozzle for gravity feed applications in large cracks.

ETI Cartridge System

Model No.	Capacity ml (ounces)	Cartridge Type	Carton Quantity	Dispensing Tool	Mixing Nozzle
ETILV22	650 (22)	side-by-side	10	EDT22S, EDT22AP	EMN022 (included)
ETIGV22					
ETISLV22					

ETI Material Property

Property	Test Method	Results		
		ETI-LV	ETI-GV	ETI-SLV
Viscosity (24°C)	ASTM D2393	1790 cps	Non-sag gel	350 cps
Bond strength (moist cure)	2 days	17.2 MPa	7.6 MPa	21.4 MPa
	14 days	17.5 MPa	27.5 MPa	26.9 MPa
Tensile strength (7 days)	ASTM D638	51.5 MPa	—	70.33 MPa
Tensile elongation at break	ASTM D638	9.4%	—	2.10%
Compressive yield strength (7 days)	ASTM D695	86.1 MPa	79.8 MPa	113.8 MPa
Compressive modulus	ASTM D695	2358 MPa	2780 MPa	3923 MPa
Deflection temperature	ASTM D648	12.2°C	12.8°C	60°C
Water absorption (24 hours)	ASTM D570	0.76%	0.58%	0.25%
Linear coefficient of shrinkage	ASTM D2566	0.004	0.000	0.0035
Gel time	ASTM C881	120 min	135 min	16 min.
Initial cure (22°C)	—	24 hrs	24 hrs	24 hours

IMPORTANT – See Page 30–31 for Installation Instructions

Crack-Pac® Injection Epoxy

The Crack-Pac® two-part, high solids, low-viscosity crack injection epoxy is designed to repair cracks in concrete. The mixed adhesive has the viscosity of a light oil and a low surface tension that enables it to penetrate fine to medium width cracks. Resin is contained in the cartridge and hardener is contained in the nozzle. Once the nozzle is threaded onto the cartridge, the hardener is released into the resin-filled cartridge by turning the knob at the base of the nozzle. The two components are mixed by shaking the cartridge.

FEATURES:

- Dispenses with a standard caulking tool, no dedicated dispensing tool needed
- Low viscosity
- Clean and easy mixing; no additional tools required
- Chemically bonds with the concrete to restore strength
- Resistant to oils, salts and mild chemicals
- Non-shrink
- Conforms to of ASTM C-881 Type I & II, Grade 1, Classes B & C

APPLICATION: Suitable for repair of cracks ranging from 0.4 mm 6.4 mm wide in concrete walls, floors, slabs, columns and beams. Can be used to inject cracks in dry, damp or wet conditions with excellent results. Not for use in actively leaking cracks. Apply to concrete 5°C or above.

SHELF LIFE: 24 months from date of manufacture, unopened

USAGE TEMPERATURE: In order for components to mix properly, the resin and hardener must be conditioned to 16°C – 27°C before mixing.

STORAGE CONDITIONS: For best results, store between 7°C – 36°C

COLOR: Resin - blue, hardener - clear, mixed: light amber. The color of epoxy will change from amber to blue during the cure process and then fade back to light amber within a few weeks of installation.

CLEAN UP: Wipe up with cotton cloths. If desired scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), laquer thinner, or adhesive remover can be used. DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN. Take appropriate precautions when handling flammable solvents. Solvents may damage surfaces to which they are applied. Cured material – Chip or grind off surface.

PROPERTY	TEST METHOD	RESULTS
Viscosity (mixed, 22°C)	ASTM D 2393	1,400 cps
Bond strength (moist cure)	ASTM C 882	13.86 MPa (2 days) 26.41 MPa (14 days)
Water absorption	ASTM D 570	0.082% (24 hrs)
Tensile strength	ASTM D 638	40.40 MPa (7 days)
Elongation at ultimate	ASTM D 638	14.1%
Compressive yield strength	ASTM D 695	77.70 MPa (7 days)
Compressive modulus	ASTM D 695	2,196.67 MPa
Linear coefficient of shrinkage	ASTM D 2566	0.002
Gel time (22°C)	ASTM C 881	2 hours - 60 g mass
Initial cure (22°C)		24 hours
Mixing ratio		8:1

CHEMICAL RESISTANCE: Very good to excellent against distilled water, inorganic acids and alkalis. Fair to good against organic acids and alkalis, and many organic solvents. Poor against ketones.

Crack-Pac® Cartridge System

Model No.	Capacity mL (cc)	Cartridge Type	Carton Quantity	Dispensing Tool(s)
ETIPAC10	266 (266.2)	single	12	CDT10S or standard caulking tool
ETIPAC10KT	532 (532.3)	single	2 (kits)	

ACCESSORIES: See page 29 for information on mixing nozzles, parts, fittings and paste-over material.



Crack-Pac® Injection Epoxy (ETIPAC10)
Dispensing Systems: U.S. Patents 6,737,000 and 6,896,001 B2



Crack-Pac® Kit (ETIPAC10KT)



Crack-Pac® Kit Components

Crack-Pac® injection epoxy is also available in the Crack-Pac Injection Kit. The kit includes everything needed to pressure inject approximately 2.4 meters of cracks:

- 2 Crack-Pac cartridge/nozzle sets
- 12 E-Z-Click™ injection ports
- 2 E-Z-Click™ injection fittings with 300 mm tubing
- 473 ml of paste-over epoxy (236 ml of resin + 236 ml of hardener)
- 4 disposable wood paste-over applicators
- 1 pair latex gloves
- Installation video



Crack-Pac® injection epoxy using the E-Z-Click Port System

IMPORTANT – See Page 30–31 for Installation Instructions

Crack-Pac® Flex-H₂O™ Polyurethane Crack Sealer

Crack-Pac® Flex-H₂O™ is a high-solids hydrophobic polyurethane injection resin designed to seal leaking cracks, voids or fractures in concrete or solid masonry. The polyurethane is packaged in the cartridge and an accelerator is packaged in the nozzle. When the two are combined in the cartridge and mixed, the result is a low-viscosity, water-activated polyurethane. When the resin encounters water as it is injected into the crack, it becomes an expanding foam that provides a flexible seal in leaking and non-leaking cracks.

FEATURES:

- Seals seeping or mildly leaking cracks
- 400% elongation provides a flexible seal for moving cracks
- Can be dispensed with a standard caulking tool
- Can also be used on dry cracks
- Can be used with a reduced amount or without accelerator to slow down reaction time
- Expands to fill voids and seal the affected crack
- Expanding nature makes it suitable for sealing cracks in solid masonry
- Fast reacting - reaction begins within 1 minute after exposure to moisture; expansion may be completed within 3 minutes (depending on the amount of moisture and the ambient temperature).
- Non-shrinking hydrophobic formula with the elongation and flexibility of a hydrophilic resin
- 20:1 expansion ratio (unrestricted rise) means less material needed

APPLICATION: Suitable for sealing cracks ranging from 0.8 mm to 6.4 mm wide in concrete and solid masonry. Can be used to repair cracks in dry, damp and wet conditions with excellent results. Designed to perform in applications where water is seeping or mildly leaking from the crack. Apply to concrete 5°C or above.

SHELF LIFE: 12 months from the date of manufacture, unopened.

USAGE TEMPERATURE: In order for components to mix properly, condition to 15°C – 32°C before mixing.

STORAGE CONDITIONS: For best results store in a dry area between 7°– 35°C. Product is very moisture sensitive.

COLOR: Polyurethane - clear, accelerator - green, cured - green

CLEAN UP: Uncured material – Wipe up with cotton cloths. If desired scrub area with abrasive, waterbased cleaner and flush with water. If approved, solvents such as ketones (MEK, acetone, etc.), lacquer thinner, or adhesive remover can be used. **DO NOT USE SOLVENTS TO CLEAN ADHESIVE FROM SKIN.** Take appropriate precautions when handling flammable solvents. Solvents may damage surfaces to which they are applied. Cured material – scrape or brush off surface with a putty knife or wire brush. Tip: wetting the concrete or masonry surface immediately prior to injection will make cured resin easier to remove.

PROPERTY	TEST METHOD	RESULTS
Viscosity (25°C)	ASTM D 1638	600 cps (liquid state)
Density	ASTM D 1622	1041 kg/m ³ (Highly restricted rise) 160 kg/m ³ (Lightly restricted rise)
Elongation	ASTM D 638	400% (Highly restricted rise) 400% (Lightly restricted rise)
Tensile strength	ASTM D 638	15 MPa (Highly restricted rise) 2 MPa (Lightly restricted rise)
Tear strength	ASTM D 624	2.7 MPa (Highly restricted rise) 0.4 MPa (Lightly restricted rise)

CHEMICAL RESISTANCE

Very good to excellent against water, most hydrocarbons and alkalis. Poor to fair against ketones, chlorinated solvents and concentrated acids.

Additional Components Needed for Crack Repair

Condition	Paste-Over Material	Injection Ports
Dry Crack	ETR, CIP	EIP-EZA
Wet Crack		
Seeping Crack	Hydraulic Cement	EIPX-EZ Drill-In
Mildly Leaking Crack		

See page 29 for information on Crack Repair Accessories.

DEFINITIONS:

Dry Crack: A crack containing no moisture.

Wet Crack: A crack containing moisture (damp or containing standing water). The surface can be dried and will remain dry during the paste-over operation.

Seeping Crack: A wet crack that slowly oozes water. After being dried, the surface slowly becomes wet again.

Mildly Leaking Crack: A crack with a slow trickle of water emitting from its face.



Crack-Pac® Flex-H₂O™ Crack Sealer

Dispensing System: U.S. Patents 6,737,000 and 6,896,001 B2



For Leaking Cracks



Crack-Pac® Flex-H₂O™ Kit (CPFH09KT)



Crack-Pac® Flex-H₂O™ Kit Components

Crack-Pac® Flex-H₂O™ crack sealer is also available in the Crack-Pac Flex-H₂O Injection Kit. The kit includes everything needed to pressure inject approximately 2.4 meters of cracks:

- 2 Crack-Pac Flex-H₂O cartridge/nozzle sets
- 12 E-Z-Click™ injection ports
- 2 E-Z-Click™ injection fittings with 300 mm tubing
- 473 ml of paste-over epoxy (236 ml of resin + 236 ml of hardener)
- 4 disposable wood paste-over applicators
- 1 pair latex gloves

Crack-Pac® Flex-H₂O™ Cartridge System

Model No.	Capacity ml (ounces)	Cartridge Type	Carton Quantity	Dispensing Tool(s)
CPFH09	266 (9)	single	12	High Quality Standard Caulking Tool
CPFH09KT	532 (18)	single	2 (kits)	

Crack-Pac® Flex-H₂O™ Bulk Packaging

Model No.	Description	Capacity	Dispensing Tool/Equipment
FH05*	Flex-H ₂ O Resin	18.9 L	Bulk Pump/Meter Mix Machine or Grease Gun (by others)
	Flex-H ₂ O Catalyst	473ml	

* For standard reaction time, use a 30:1 resin: catalyst ratio. For a faster reaction time, add more catalyst, for a slower reaction time, use less.

ACCESSORIES: See pages 29 for information on mixing nozzles, parts, fittings and paste over material.

IMPORTANT – See Page 32–34 for Installation Instructions

Crack-Pac® and Crack-Pac® Flex-H₂O™ Injection Epoxy



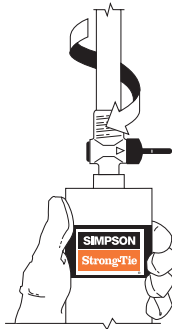
Wear gloves when handling the Crack-Pac® and Crack-Pac® Flex-H₂O™ cartridge once the resin and hardener are mixed, as material may become hot. Eye protection is recommended.

CARTRIDGE PREPARATION AND MIXING INSTRUCTIONS:

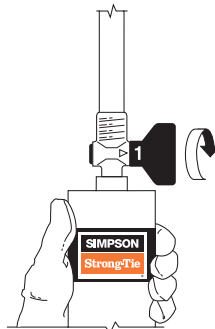
Usage tip: After the product is mixed, a small volume of air will remain in the cartridge. Keeping this cushion of air at the back of the cartridge during dispensing will allow the dispensing of the final bit of epoxy from the nozzle once the cartridge is empty.



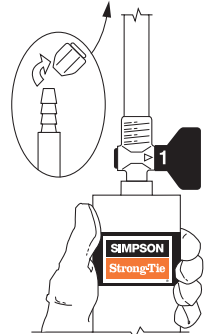
1. Remove the red cap from the top of the cartridge.



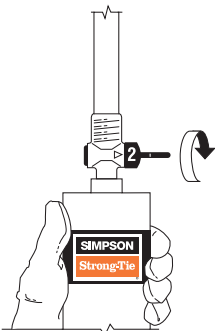
2. Screw the threaded portion of the nozzle into the cartridge.



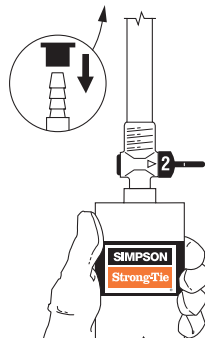
3. Turn the black valve so that the #1 on the valve aligns with the arrow on the neck of the nozzle.



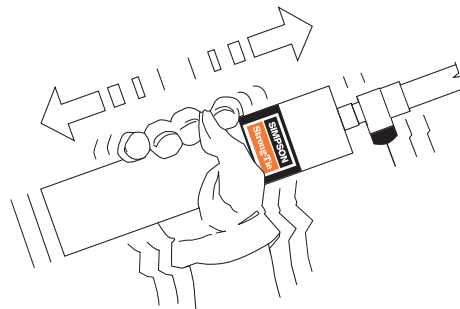
4. Twist off the tip of the nozzle and allow the material contained within to drain into the cartridge.



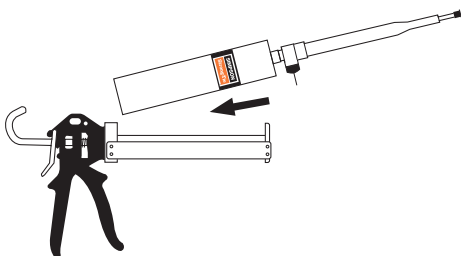
5. Turn the black valve to the #2 position.



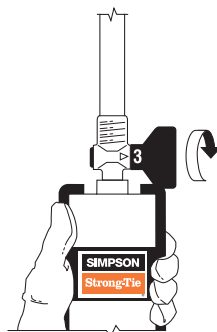
6. Attach the clear cap securely to the end of the nozzle.



7. Shake the cartridge at a rate of 2 shakes per second for 2 minutes or until the mixed material is a uniform color.



8. Insert the cartridge into the caulking tool.



9. Turn the black valve to the #3 position and remove the black cap from the end of the nozzle. If performing gravity feed, the material is ready to dispense. If performing pressure injection, attach the E-Z-Click™ injection fitting to the end of the nozzle.



Warning: Do not mix product until ready to use within 30 minutes. A full

cartridge of mixed epoxy will harden in 65–75 minutes and will reach a peak temperature of 177°C within two hours. To prevent pressure build up possibly resulting in cartridge breach and injury, remove cartridge from the caulking tool when not dispensing. Use caution handling or disposing of cartridge until cool.

Crack Repair Accessories

Crack Repair Accessories

EMN022 – Opti-Mix® Mixing Nozzle

The Opti-Mix® static mixing nozzle is specifically designed for crack injection epoxies and ensures thorough mixing of epoxy components:

- For use with both low-viscosity and gel-viscosity ETI formulations.
- Flow regulators ensure that resin and hardener flow at equal rates and prevent mixed epoxy from flowing back out of the nozzle into the cartridge. This ensures thorough mixing and prevents mixed product from curing in the neck of the cartridge, causing blockage. Testing shows that mixing with the Opti-Mix nozzle is 4 times more consistent than a standard spiral mixing nozzle.
- For use with pneumatic, battery and manual dispensing tools.
- Half the length of standard spiral mixing nozzles, allowing easy access in cramped conditions and reducing waste.
- Barbed end allows easy attachment to the E-Z-Click™ injection fitting.
- When dispensing low-viscosity material, using a standard spiral mixing nozzle and a manual dispensing tool, resin and hardener surge unevenly through the nozzle without being thoroughly combined. The result is poorly mixed epoxy that will not fully cure and will not effectively repair the crack. The Opti-Mix nozzle corrects this problem utilizing unique mixing elements and a flow regulator that allows the use of a manual tool with low-viscosity epoxy.

E-Z-Click™ Injection System

The E-Z-Click injection system is comprised of a specially designed fitting and ports that take the mess out of your repair project while allowing you to work faster. The E-Z-Click injection fitting installs onto the end of the Opti-Mix mixing nozzle and clicks onto the E-Z-Click™ ports during injection.

- Positive connection eliminates messy leakage, minimizing waste and clean-up.
- No drilling of ports: E-Z-Click ports perform while pasted to the surface of the concrete. No drilling required for most applications.
- Disconnect the fitting from the E-Z-Click port and the epoxy stops flowing, no leaky mess.
- After injecting, pull the head of the E-Z-Click port out to close it and prevent leakage.
- One person can work faster without having to hold the tube on the port.

ETR Epoxy Paste-Over

Ideal for pasting over the surface of cracks and attaching ports for pressure injection. The non-sag paste consistency enables paste-up on horizontal, vertical and overhead applications. Fast cure time means shorter time between paste-over and injection. Packaged as a kit in separate 237 ml canisters which are mixed manually to yield 473 ml of epoxy. Also ideal for small concrete repairs and miscellaneous patching. Each kit contains enough material to cover approximately 2.5 meters of cracks.

CIP Paste-Over

CIP is a fast-curing, two-part epoxy paste-over material. It is used to seal cracks and to secure injection ports over concrete prior to epoxy or urethane foam injection repair. CIP sets up rigid and can either be left on the concrete or ground or chiseled off at the completion of a crack injection job.

Crack Repair Accessories Product Data

Description	Model No.	Pkg. Qty.	Ctn. Qty. (ea.)
(6) Opti-Mix® mixing nozzles for ETI epoxies (165 mm, 9.53 mm square). Includes retaining nuts. ¹	EMN022-RP6	6	30 (5 Packs)
(100) E-Z-Click™ flush mount injection ports and (1) E-Z-Click injection fitting (compatible with all Simpson Strong-Tie paste-overs)	EIP-EZA	—	100
(20) E-Z-Click flush mount injection ports	EIP-EZAKT	—	5 Kits
(20) E-Z-Click corner mount/drilled-in injection ports ²	EIPX-EZ-RP20	20	100 (5 Packs)
(20) E-Z-Click corner mount/drilled-in injection ports and (1) E-Z-Click injection fitting ²	EIPX-EZKT	—	5 Kits
E-Z-Click injection fitting	EIF-EZ	1	10
ETR Kit containing (1) 237 ml canister of resin and (1) 237 ml canister of hardener	ETR16	—	4 Kits

1. Use only an appropriate Simpson Strong-Tie® mixing nozzle in accordance with Simpson Strong-Tie instructions. Modification or improper use of mixing nozzle may impair epoxy performance.
2. EIPX intended for use as a surface mount port in corners and a drilled-in port on flat surfaces. All accessories compatible with ETI-LV, ETI-GV and ETI-SLV epoxies.

Crack Injection Paste-Over in Cartridge Delivery System

Model No.	Capacity mL (cc)	Cartridge Type	Carton Quantity	Dispensing Tool(s)	Mixing Nozzle
CIP22	650	side-by-side	10	EDT22S EDTA22P EDTA22CKT	EMN22i



Opti-Mix®
Mixing Nozzle



E-Z-Click™ Ports and
Injection Fitting



E-Z-Click™
Injection Fitting



EIP-EZA
Flush Mount
Port



EIPX-EZ
Corner
Mount/
Drilled-In
Port



ETR16



CIP

Cure Schedule - ETR and CIP

Base Material Temperature °C	Cure Time
4	24 hrs.
16	2 hrs.
27	1 hr.
38	1 hr.

Detailed information on the full line of Simpson Strong-Tie® manual and pneumatic dispensing tools is available on pages 18.

Epoxy or ETI Crack Repair *Method Statement*

Important: These instructions are intended as recommended guidelines. Due to the variability of field conditions, selection of the proper material for the intended application and installation are the sole responsibility of the applicator.

Epoxy injection is an economical method of repairing non-moving cracks in concrete walls, slabs, columns and piers and is capable of restoring the concrete to its pre-cracked strength. Prior to doing any injection it is necessary to determine the cause of the crack. If the source of cracking has not been determined and remedied, the concrete may crack again.

Materials

- ETI-SLV for repair of hairline cracks and cracks up to 6 mm
- ETI-LV for repair of fine to medium-width cracks (Suggested width range: 0.4 mm–6 mm).
- ETI-GV for repair of medium-width cracks (Suggested width range: 2.4 mm–6 mm)
- E-Z-Click™ injection ports, fittings and other suitable accessories.

Preparation of the Crack for Injection

Clean the crack and the surface surrounding it to allow the epoxy to bond to sound concrete. At a minimum, the surface to receive paste-over should be brushed with a wire brush. Oil, grease or other surface contaminants must be removed in order to allow the paste-over to bond properly. Take care not to impact any debris into the crack during cleaning. Using clean, oil free compressed air, blow out the crack to remove any dust, debris or standing water. Best results will be obtained if the crack is dry at the time of injection. If water is continually seeping from the crack, the flow must be stopped in order for epoxy injection to yield a suitable repair. Other materials such as polyurethane resins may be required to repair an actively leaking crack.

For many applications, additional preparation is necessary in order to seal the crack. Where a surfacing material has been removed using an acid or chemical solvent, prepare the crack as follows:

1. Using clean, oil-free compressed air, blow out any remaining debris and liquid.
2. Remove residue by high-pressure washing or steam cleaning.
3. Blow any remaining water from the crack with clean, oil-free compressed air.

If a coating, sealant or paint has been applied to the concrete it must be removed before placing the paste-over epoxy. Under the pressure of injection these materials may lift and cause a leak. If the surface coating is covering the crack, it may be necessary to rout out the opening of the crack in a “V” shape using a grinder in order to get past the surface contamination.

Sealing of the Crack and Attachment of E-Z-Click™ injection ports

1. To adhere the port to the concrete, apply a small amount of epoxy around the bottom of the port base. Place the port at one end of the crack and repeat until the entire crack is ported. As a rule of thumb, injection ports should be placed 200 mm apart along the length of the crack.

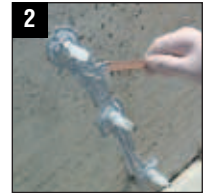
Important: Do not allow epoxy to block the port or the crack under it, this is where epoxy must enter the crack.



2. Using a putty knife or other paste-over tool, generously work epoxy along the entire length of the crack. Take care to mound the epoxy around the base of the port to approximately 6 mm thick extending 25 mm out from the base of the port and to work out any holes in the material. It is recommended that the paste-over should be a minimum of 5 mm thick and 25 mm wide along the crack. Insufficient paste-over will result in leaks under the pressure of injection. If the crack passes completely through the concrete element, seal the back of the crack, if possible. If not, epoxy may be able to run out the back side of the crack, resulting in an ineffective repair.



3. Allow the paste-over to harden before beginning injection.



Note: CIP, CIP-F and ETR epoxies are fast cure, manually-mixed materials and may harden prematurely if left in a mixed mass on the mixing surface while installing ports. Spreading paste-over into a thin film (approximately 3mm) on the mixing surface will slow curing by allowing the heat from the reaction to dissipate.

Injection Procedure for ETI-LV and ETI-GV Injection Epoxy

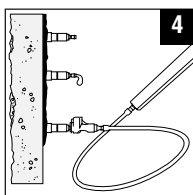
1. Follow cartridge preparation instructions on the cartridge label. Purge and discard a minimum of 5 trigger pulls of product to verify that mixed material flowing through Opti-Mix® nozzle is of uniform color. If mixed product is not uniform color, remove mixing nozzle, verify that both ports of cartridge are free and clear, and repeat mixing process.

2. Attach the E-Z-Click™ fitting to the end of the nozzle by pushing the tubing over the barbs at the end of the nozzle. Make sure that all ports are pushed in to the open position.

3. Attach the E-Z-Click™ injection fitting to the first E-Z-Click™ port until it clicks into place. Make sure that the heads of all the ports are pushed in to the open position. In vertical applications, begin injection at the lowest port and work your way up. In a horizontal application start at one end of the crack and work your way to the other end.



4. Inject epoxy into the first port until it will no longer flow into the crack. If epoxy shows at the next port and the first port still accepts material, close the second port and continue to inject into the first port until it accepts no more epoxy. Continue closing ports where epoxy appears until the first port refuses epoxy. When the first port reaches the point of refusal, brace the base of the port and pull out gently on the head of the port to close it.



Pulling too hard may dislodge the port from the surface of the concrete, causing a leak. Depress the metal tab on the head of the E-Z-Click fitting and remove it from the port.

5. Go to the last port where epoxy appeared while injecting the first port, open it, and continue injection at this port. If the epoxy has set up and the port is bonded closed, move to the next clean port and repeat the process until every portion of the crack has refused epoxy.

While this method may appear to leave some ports uninjected, it provides maximum pressure to force the epoxy into the smaller areas of the crack. Moving to the next port as soon as epoxy appears will allow the epoxy to travel along the wider parts of the crack to the next ports rather than force it into the crack before it travels to the next ports.

Injection Tips

- If using a pneumatic dispensing tool, set the tool at a low setting when beginning injection and increase pressure if necessary to get the epoxy to flow.
- For narrow cracks it may be necessary to increase the pressure gradually until the epoxy begins to flow. It may also be necessary to wait a few minutes for the epoxy to fill the crack and travel to the next port.
- If desired, once the injection epoxy has cured, remove the injection ports and paste-over epoxy. The epoxy can be removed with a chisel, scraper, or grinder. Using a heat gun to soften the epoxy is recommended when using a chisel or scraper.
- Mixing nozzles can be used for multiple cartridges as long as the epoxy does not harden in the nozzle.

Epoxy or ETI Crack Repair *Method Statement***Troubleshooting**

Epoxy is flowing into the crack, but not showing up at the next port. This can indicate that either the crack expands and/or branches off under the surface of the concrete. Continue to inject and fill these voids. In situations where the crack penetrates completely through the concrete element and the backside of the concrete element cannot be sealed (e.g. basement walls, or footings with backfill), longer injection time may not force the epoxy to the next port. This most likely indicates that epoxy is running out of the unsealed back side of the crack. In this case the application may not be suitable for epoxy injection repair without excavation and sealing of the back side of the crack.

Back pressure is preventing epoxy from flowing.

This can indicate several situations:

- The crack is not continuous and the portion being injected is full (see method statement about injection after the port has reached refusal).
- The port is not aligned over the crack properly.
- The crack is blocked by debris.
- If the mixing nozzle has been allowed to sit for a few minutes full of epoxy, the material may have hardened in the nozzle. Attach the E-Z-Click™ fitting to a port at another uninjected location on the crack and attempt to inject. If the epoxy still won't flow, chances are the epoxy has hardened in the nozzle.

Epoxy is leaking from the pasted-over crack or around injection ports.

Stop injecting. If using a fast cure paste-over material (ETR or CIP), wipe off the leaking injection epoxy with a cotton cloth and re-apply the paste over material. Wait approximately 10–15 minutes to allow the epoxy to begin to harden. If the leak is large (e.g. the port broke off of the concrete surface) it is a good idea to wait approximately 30 minutes, or longer as necessary, to allow the paste over to cure more completely. Check to see that the epoxy is rigid before reinjecting or the paste-over or ports may leak. Another option for small leaks is to clean off the injection epoxy and use paraffin or crayon to seal the holes.

More epoxy is being used than estimated.

This may indicate that the crack either expands or branches off below the surface. Continue to inject and fill these voids. This may also indicate that epoxy is running out of the back side of the crack. If the crack penetrates completely through the concrete element and cannot be sealed, the application may not be suitable for injection repair.

Less epoxy is being used than estimated.

This may indicate that the crack is shallower than originally thought, or the epoxy is not penetrating the crack sufficiently before moving to the next port. Reinject some ports with a lower viscosity epoxy to see if the crack will take more epoxy. Another option is to heat the epoxy to a temperature of 25–35°C which will reduce its viscosity and allow it to penetrate into small cracks easier. The epoxy should be heated uniformly, do not overheat cartridge.

Gravity-Feed Procedure

Some horizontal applications where complete penetration is not a requirement can be repaired using the gravity feed method.

1. Follow cartridge preparation instructions on the cartridge label. Verify that the material flowing from the Opti-Mix® mixing nozzle is a uniform black color for ETI-SLV and ETI-LV and a uniform gray color for ETI-GV. For Crack-Pac® injection epoxy verify that the mixed material in the cartridge is a clear amber color.
2. Starting at one end of the crack, slowly dispense epoxy into the crack, moving along the crack as it fills. It will probably be necessary to do multiple passes in order to fill the crack. It is possible that the epoxy will take some time to run into the crack, and the crack may appear empty several hours after the initial application. Reapply the epoxy until the crack is filled. In situations where the crack completely penetrates the member (e.g. concrete slab) the material may continue to run through the crack into the subgrade. In these cases epoxy repair may not provide an effective repair.

Tip: For narrow cracks, run a bead of caulk along each side of the crack approximately 3 mm from the edge of the crack. This will form a reservoir into which epoxy can be dispensed. Alternatively, use a grinder to rout the crack opening into a “V” shape. Take care to clean the crack with compressed air afterwards as grinding can impact dust and debris into the crack and prevent proper flow of the epoxy.

Simpson Strong-Tie does not recommend repair of cracks larger than 6 mm wide without consulting a qualified engineer.

Estimating Guide for Epoxy Crack Injection

Width of Crack (mm)	Concrete Thickness (mm)	Approximate Coverage per 650 ml (lin metre)	Approximate Coverage per 265 ml (lin metre)	Width of Crack (mm)	Concrete Thickness (mm)	Approximate Coverage per 650 ml (lin metre)
0.4	100	14	5.6	6	100	0.9
	150	9.6	3.7		150	0.6
	200	7.2	2.8		200	0.45
	250	5.8	2.2		250	0.4
0.8	100	7.2	2.8	8	100	0.7
	150	4.8	1.8		150	0.5
	200	3.6	1.4		200	0.4
	250	2.9	1.1		250	0.3
1.5	100	3.6	1.4	10	100	0.6
	150	2.4	0.9		150	0.4
	200	1.8	0.7		200	0.3
	250	1.4	0.6		250	0.2
3	100	1.8	0.7	11	100	0.5
	150	1.2	0.4		150	0.3
	200	0.9	0.3		200	0.25
	250	0.7	0.2		250	0.2
5	100	1.2	0.45	12	100	0.45
	150	0.8	0.3		150	0.3
	200	0.6	0.24		200	0.2
	250	0.5	0.18		250	0.18

These calculations are only estimates and to be used as a guide only.



Important: These instructions are intended as recommended guidelines. Due to the variability of field conditions, selection of the proper material for the intended application and installation are the sole responsibility of the applicator.

Application

Polyurethane injection is an effective and economical method of sealing cracks in concrete and solid masonry elements. Crack-Pac® Flex-H₂O™ crack sealer is suitable for sealing dry, wet, seeping and mildly leaking cracks in horizontal and vertical concrete and solid masonry elements ranging from 0.8 mm-6.4 mm.

Definitions:

Dry Crack – a crack containing no moisture

Wet Crack – a crack containing moisture (damp or containing standing water). The surface can be dried and will remain dry during the paste-over operation.

Seeping Crack – a wet crack that slowly oozes water. After being dried, the surface slowly becomes wet again.

Mildly Leaking Crack – a crack with a slow trickle of water emitting from its face.

NOTE: Multiple applications may be necessary to fill all voids.

Preparing the Crack for Injection

Clean the crack and the surface surrounding it to allow the paste-up material to bond to sound concrete. At a minimum, the surface to receive paste-over should be brushed with a wire brush. Oil, grease or other surface contaminants must be removed in order to allow the paste-over to bond properly. Take care not to impact any debris into the crack during cleaning. With dry cracks, use clean, oil-free compressed air to blow out as much dust and debris from the crack.

For many applications, additional preparation is necessary in order to seal the crack. Where a surfacing material has been removed using an acid or chemical solvent, prepare the crack as follows:

1. Using clean, oil-free compressed air, blow out any remaining debris and liquid.
2. Remove residue by high-pressure washing or steam cleaning.
3. Blow any remaining water from the crack with clean, oil-free compressed air.

If a coating, sealant or paint has been applied to the concrete it must be removed before placing the paste-over material. Under the pressure of injection these materials may lift and cause a leak. If the surface coating is covering the crack, it may be necessary to rout out the surface of the crack in a "V" shape using a grinder in order to get past the surface contamination.

Dry or Wet Crack Application - Sealing of the crack and attachment of E-Z-Click™ flush mount injection ports (Model EIP-EZA)

1. To adhere the port to the concrete, apply a small amount of epoxy around the bottom of the port base. Place the port at one end of the crack and repeat until the entire crack is ported. As a rule of thumb, injection ports should be placed 200 mm apart along the length of the crack.



IMPORTANT: Do not allow epoxy to block the port or the crack under it, this is where adhesive must enter the crack.

2. Using a putty knife or other paste-over tool, generously work epoxy along the entire length of the crack. Take care to mound the epoxy around the base of ports and to work out any holes in the material. It is recommended that the paste-over should be a minimum of 5 mm thick and 25 mm wide. Insufficient paste-over will result in leaks under the pressure of injection. Allow the paste-over to cure before beginning injection.



3. For Dry Cracks- Crack-Pac Flex-H₂O reacts with water and needs moisture present to activate. Therefore, if the crack to be sealed is completely dry, water must be introduced into it. Once ports are in place and the crack surface is pasted over, use a syringe or spray bottle to introduce approximately 30 ml of water into each port.



Note: CIP, CIP-F and ETR epoxies are fast cure, manually-mixed materials and may harden prematurely if left in a mixed mass on the mixing surface while installing ports. Spreading paste-over into a thin film (approximately 3 mm) on the mixing surface will slow curing by allowing the heat from the reaction to dissipate.

Seeping Crack Application - Sealing of the crack and attachment of E-Z-Click flush mount injection ports (Model EIP-EZA)

1. Mix a small amount of quick-setting hydraulic cement with water in a container per manufacturer's recommendation (leave cement thick so it can be molded). Apply the cement generously to the top of the port flange and hold the port onto the concrete/masonry surface at one end of the crack until it sticks when the hand is released (usually about 1 minute). Repeat until the entire crack is sealed and ported.

IMPORTANT: Be sure not to cover the port opening/closing interface with the cement. If this interface is covered, the cement must be cut away from this interface with a utility knife once it is cured, otherwise, the port will not close.

2. To seal the remaining portions of the crack, mix small amounts of the hydraulic cement and apply it to the crack in a similar fashion. It is recommended that the paste-over be 5 mm thick and 25 mm wide. Once the entire crack is covered, all leaking water should be directed through the open ports. If water is leaking from any parts of the paste-over, be sure to patch these areas with additional hydraulic cement before injecting the crack.

Mildly Leaking Crack Application - Sealing of the crack and attachment of E-Z-Click™ drill-in injection ports (Model EIPX-EZA)

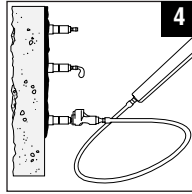
1. Using a hammer drill or roto-hammer, drill 16 mm holes 19 mm deep at each end of the crack and along the crack approximately 200 mm apart.
2. Using the E-Z-Click Drilled-In port (model EIPX-EZA), gently hammer the port into the drilled hole at the top of a vertical crack or at either end of a horizontal crack. Mix a small amount of quick-setting hydraulic cement with water in a container per manufacturer's recommendation (leave cement thick so it can be molded).
3. Apply the cement generously to the top of the port flange and hold until it sticks when the hand is released (usually about 1 minute). Repeat until the entire crack is sealed and ported.

IMPORTANT: Be sure not to cover the port opening/closing interface with the cement. If this interface is covered, the cement must be cut away from this interface with a utility knife once it is cured, otherwise, the port will not close.

4. To seal the remaining portions of the crack, mix small amounts of the hydraulic cement and apply it to the crack in a similar fashion. Starting at one end and working toward the other. In vertical applications start at the top and work down. It is recommended that the paste-over be at least 5 mm thick and 25 mm wide. Once the entire crack is covered, all leaking water should be directed through the open ports. If water is leaking from any parts of the paste-over, be sure to patch these areas with additional hydraulic cement before injecting the crack.

Injection Procedure for Crack-Pac® Flex-H₂O™ crack sealer

1. Follow cartridge preparation instructions on the cartridge label. Verify that the material flowing from the nozzle is a uniform green color.
2. Attach the E-Z-Click™ fitting to the end of the nozzle by pushing the tubing over the barbs at the end of the nozzle. Make sure that all ports are pushed in to the open position.
3. Attach the E-Z-Click™ injection fitting to the first E-Z-Click™ port until it clicks into place. Make sure that the head of the port is pushed in to the open position. In vertical applications, begin injection at the lowest port and work your way up. In a horizontal application start at one end of the crack and work your way to the other end.
4. Inject polyurethane into the first port until material shows at the next port. Remove the E-Z-Click fitting by bracing the base of the port and pulling out gently on the head of the port to close it. Pulling too hard may dislodge the port from the surface of the concrete, causing a leak. Depress the metal tab on the head of the E-Z-Click fitting and remove it from the port.
5. Move to the next port and repeat until all ports have been injected.

**Injection Tips**

- For narrow cracks it may be necessary to increase the pressure gradually until the polyurethane begins to flow. It may also be necessary to wait a few minutes for the material to fill the crack and travel to the next port.
- If desired, once the polyurethane has cured, remove the injection ports and paste-over epoxy or hydraulic cement. The paste-over can be removed with a chisel, scraper or grinder.

Troubleshooting***Polyurethane is flowing into the crack, but not showing up at the next port.***

This can indicate that either the crack expands and/or branches off under the surface of the concrete. Continue to inject and fill these voids.

Back pressure is preventing polyurethane from flowing.

This can indicate several situations:

- The crack is not continuous and the portion being injected is full.
- The port is not aligned over the crack properly.
- The crack is blocked by debris.

Polyurethane is leaking from the pasted-over crack or around injection ports.

Stop injecting. If using a fast cure paste-over material (ETR or CIP), wipe off the leaking injection epoxy with a cotton cloth and re-apply the paste over material. Wait a approximately 10–15 minutes to allow the paste-over to begin to harden. If the leak is large (e.g. the port broke off of the concrete surface) it is a good idea to wait approximately 30 minutes, or longer as necessary, to allow the paste-over to cure more completely. Check to see that the paste-over is hard before reinjecting or the paste-over or ports may leak.

Another option for small leaks is to clean off the injection adhesive and use paraffin or crayon to seal the holes.

More polyurethane is being used than estimated.

This may indicate that the crack either expands or branches off below the surface. Continue to inject and fill these voids.

Less polyurethane is being used than estimated.

This may indicate that the crack is shallower than originally thought, or the polyurethane is not penetrating the crack sufficiently before moving to the next port.

Crack-Pac® Flex-H₂O™ Injection Guide

Preparation of the Crack for Injection

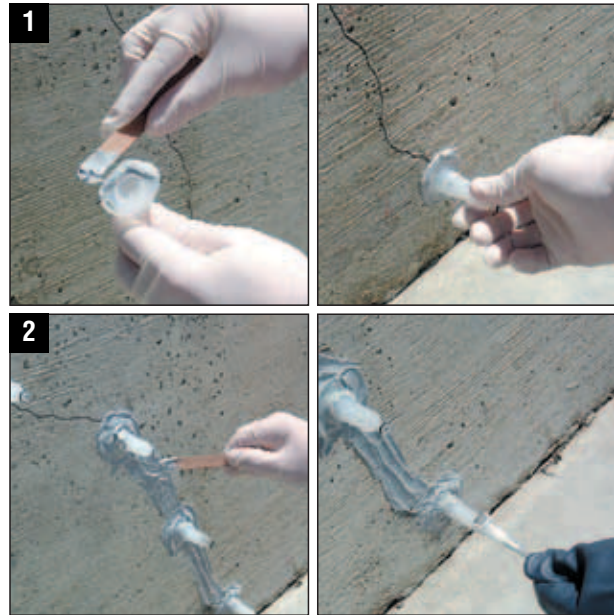
Clean the crack and the surface surrounding it to allow the epoxy to bond to sound concrete. At a minimum, the surface to receive paste-over should be brushed with a wire brush. Oil, grease or other surface contaminants must be removed in order to allow the paste-over to bond properly. Take care not to impact any debris into the crack during cleaning. Using clean, oil free compressed air, blow out the crack to remove any dust, debris or standing water. Best results will be obtained if the crack is dry at the time of injection. If water is continually seeping from the crack, the flow must be stopped in order for epoxy injection to yield a suitable repair. Other materials such as polyurethane resins may be required to repair an actively leaking crack.

1. Using clean, compressed air, blow out any remaining debris and liquid.
2. Remove residue by high-pressure washing or steam cleaning.
3. Blow any remaining water from the crack with clean compressed air.

Sealing of the Crack and Attachment of E-Z-Click™ injection ports

1. To adhere the port to the concrete, apply a small amount of epoxy around the bottom of the port base. Place the port at one end of the crack and repeat until the entire crack is ported. As a rule of thumb, injection ports should be placed 200 mm apart along the length of the crack.
Important: Do not allow epoxy to block the port or the crack under it, this is where epoxy must enter the crack.
2. Using a putty knife or other paste-over tool, generously work epoxy along the entire length of the crack. Take care to mound the epoxy around the base of the port to approximately 6 mm thick extending 25 mm out from the base of the port and to work out any holes in the material. It is recommended that the paste-over should be a minimum of 5 mm thick and 25 mm wide along the crack. Insufficient paste-over will result in leaks under the pressure of injection. If the crack passes completely through the concrete element, seal the back of the crack, if possible. If not, epoxy may be able to run out the back side of the crack, resulting in an ineffective repair.
3. Allow the paste-over to harden before beginning injection.

Note: ETR epoxies are fast cure, manually mixed materials and may harden prematurely if left in a mixed mass on the mixing surface while installing ports. Spreading paste-over into a thin film (approximately 3 mm) on the mixing surface will slow curing by allowing the heat from the reaction to dissipate.



Crack Repair Adhesive Suitability Matrix

Application / Feature	ETI-LV	Crack-Pac Flex-H ₂ O
Seals the crack against moisture	YES	YES
Restores strength to the concrete	YES	NO
Expands to fill voids	NO	YES
Flexible (allows crack movement)	NO	YES
Suitable to seal cracks in masonry	NO	YES
Suitable for dry and wet crack	YES	YES
Suitable for cracks actively leaking water	NO	YES
NSF Approved	YES	NO
Suitable installation procedure(s)	Pressure injection or gravity feed	Pressure injection
Dispensing Tool	Manual: EDT22S Pneumatic: EDT22AP	High Quality Standard caulking tool



Mechanical Anchors

Simpson Strong-Tie mechanical anchors are designed to install easily and securely into a variety of base materials, including concrete, grouted and hollow CMU and brick. Specifiers and contractors trust Simpson Strong-Tie[®] anchors for optimum performance under the most demanding structural applications.



Ultraplus Undercut Anchor Systems

ULTRAPLUS M12 – M36

The Ultraplus undercut anchor is designed for use in applications that require exceptionally high-strength performance in cracked or non-cracked concrete, seismic, and shock loading conditions. After the hole is drilled and undercut created with a LIEBIG undercutting tool, the anchor uses spring pressure to “click” into the undercut, creating “positive undercut” that allows perfect bearing of the segments and ensures reliable transmission of the load into the concrete.

PERFORMANCE FEATURES:

- Positive undercut with strong mechanical interlock is comparable to cast-in-place headed studs
- Reduced expansion forces allow for smaller edge and spacing distances
- Suitable for cracked and non-cracked concrete from C20/25 to C50/60
- Suitable for seismic applications
- Load range from 19-320 kN (tension) and 45-371 kN (shear)
- “Through-fix” installation does not require movement of fixings to be anchored
- Product range from
- Completely removable

MATERIAL: Grade 10.9 carbon steel

FINISH: Zinc plated and blue passivated

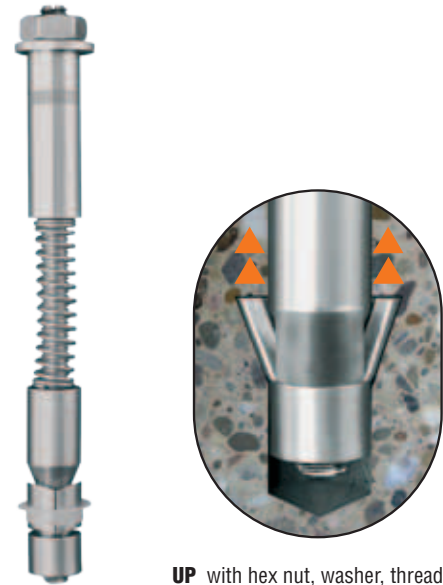
APPROVAL: ETA-04/0099—Option 1—carbon steel, zinc plated

INSTALLATION:

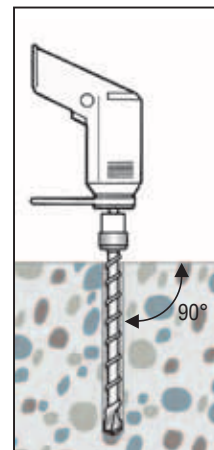
1. Drill hole to specified depth.
2. Clean hole with a blow pump.
3. Create the undercut using LIEBIG undercutting tool (approximately 15 to 70 seconds depending on the anchor size). Irrigate with water while undercutting
4. Install the LIEBIG **ULTRAPLUS** undercut anchor. The plastic ring holding the undercutting segments together will remain at the fixture.
5. Apply the specified installation torque using a calibrated torque wrench – the **ULTRAPLUS** undercut anchor is now installed and can resist loads immediately!

APPLICATIONS:

- Steel construction
- Industrial plants
- Nuclear power plants
- Conveyor systems
- Cranes



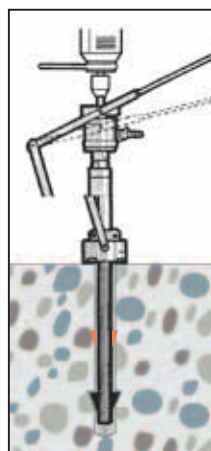
UP with hex nut, washer, threaded stud and plastic retaining ring



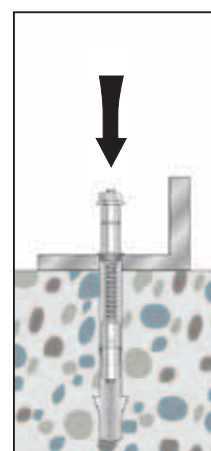
1 Drill hole to specified depth.



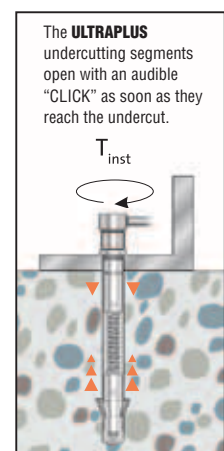
2 Clean hole with a blow pump.



3 Create the undercut using LIEBIG undercutting tool (approximately 15 to 70 seconds depending on the anchor size). Irrigate with water while undercutting.



4 Install the LIEBIG **ULTRAPLUS** undercut anchor. The plastic ring holding the undercutting segments together will remain at the fixture.



5 Apply the specified installation torque using a calibrated torque wrench – the **ULTRAPLUS** undercut anchor is now installed and can resist loads immediately!

Ultraplus Undercut Anchor Systems

Carbon steel, zinc plated

ULTRAPLUS UP



Threaded stud with hex nut and washer

Material: Grade 10.9 carbon steel, zinc plated and blue passivated

Approval: ETA-04/0099 – Option 1

Type	Order Code	Thread Size	Ø x Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Weight [kg/100 pcs]	Box Quantity [pcs]
			d _o x h ₁	t _{fix}	d _f	h _{ef}	L		
			[mm]	[mm]	[mm]	[mm]	[mm]		
UP M12-23/140/20	UP1223140020	M12	23 x 190	20	24	140	220	48.0	10
UP M16-30/220/30	UP1630220030	M16	30 x 300	30	32	220	325	123.0	5
UP M20-36/250/50	UP2036250050	M20	36 x 330	50	38	250	380	173.0	5
UP M24-45/280/60*	UP2445280060	M24	45 x 410	60	46	280	460	408.0	2
UP M36-67/420/100*	UP3667420100	M36	67 x 570	100	68	420	700	1305.0	1

*Not included in approval. Available as special order.

Custom lengths available on request.

Installation Accessories

Hand undercutting tool with lever



Undercutting tool for core drilling rigs with 1/2" drive



Diamond cutting blade



Compatible ULTRAPLUS	Order Code	kg/pc
M12	DH23	3.5
M16	DH30	4.0
M20	DH36	5.0
M24	DH45	6.0
M36	DH67	9.0

Compatible ULTRAPLUS	Order Code	kg/pc
M12	D23	2.6
M16	D30	3.1
M20	D36	4.1
M24	D45	5.1
M36	D67	8.1

Compatible ULTRAPLUS	Order Code	kg/10 pcs
M12	DE23	0.5
M16	DE30	1.0
M20	DE36	1.2
M24	DE45	2.1
M36	DE67	3.3

Special lengths upon request.

Both types of undercutting tools are available for either purchase or hire.



Ultraplus Undercut Anchor Systems

Fixing in Power Plants ▶

LIEBIG **ULTRAPLUS** undercut anchors offer high safety, especially where extraordinary loads are present. With its unique undercutting technology, the **ULTRAPLUS** is the best solution.



◀ Industrial Plants/Retrofits



The LIEBIG **ULTRAPLUS** undercut anchor can resist high loads problem-free, even at close anchor spacings. The application shown required a load capacity of 294 kN per anchor. Solution: LIEBIG **ULTRAPLUS** M36 with 630 mm embedment depth in C50/60 concrete.

Challenging Applications ▶

The LIEBIG **ULTRAPLUS** is the first choice for unique applications with high loads.



Self-Undercutting Anchor

The Superplus self-undercutting anchor combines the reliability and load capacity of an undercut anchor, with the ease of installation of an expansion anchor, with no special installation tools. As torque is applied to the anchor, the sleeve's outer cutting teeth expand and undercut into the base material, resulting in a durable mechanical interlock suitable for use in cracked and non-cracked concrete.

PERFORMANCE FEATURES:

- High capacity in cracked and non-cracked concrete (C20/25 to C50/60)
- Load range from 4-56 kN (tension) and 4-90 kN (shear)
- Simple installation, no special drill bit or setting tool required
- Two approved embedment depths per anchor diameter for “pre-set” and “through-fix” applications
- Shallow embedment depths for installation versatility

MATERIAL: Grade 8.8 carbon steel, A4-80 stainless steel

FINISH: Zinc plated and blue passivated (Grade 8.8)

APPROVAL:

ETA-01/0011—Option 1—carbon steel, zinc plated

ETA-05/0013—Option 1—A4 stainless steel

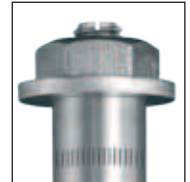
INSTALLATION:

 Through-fix installation shown

1. Drill hole to specified depth.
2. Clean hole (blowing) with hand-pump or clean, oil-free compressed air
3. Insert anchor through fixture
4. Apply recommended fastening torque with a calibrated torque-wrench

APPLICATIONS:

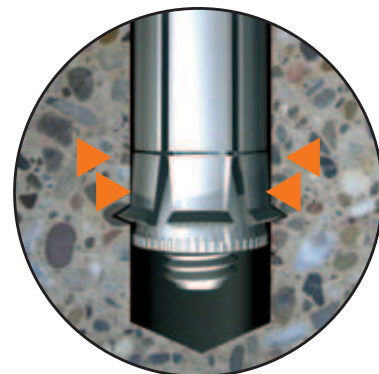
- Power plants
- Steel and industrial plants
- Cable trays
- Machines
- Facades
- Base plates



Typ ILS



Typ BLS

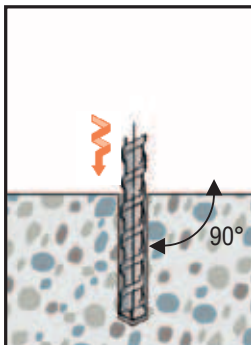


BLS with hex nut, washer and threaded stud

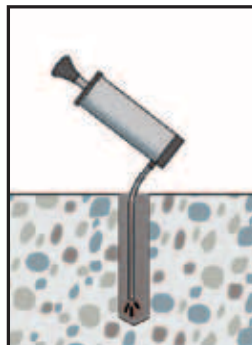


ILS with internally threaded sleeve

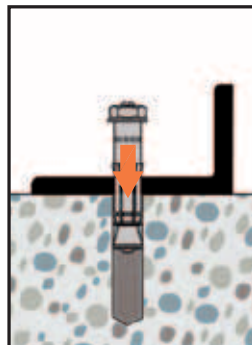
Installation

 Through-fix installation shown


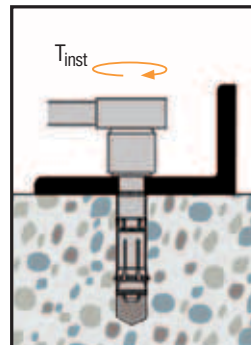
Drill hole to specified depth



Clean hole (blowing) with hand-pump or clean, oil-free compressed air



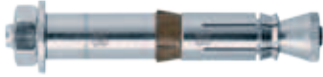
Insert anchor through fixture



Apply recommended fastening torque with a calibrated torque-wrench

Carbon steel, zinc plated

SUPERPLUS BLS



Threaded stud with hex nut and washer

Material: Grade 8.8 carbon steel, zinc plated and blue passivated

Approvals: ETA-01/0011 – Option 1

Type	Order Code	Thread Size	Ø x Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight	Box Quantity
			d ₀ x h ₁	t _{fix}	d _f	h _{ef}	L	T _{inst}		
			[mm]	[mm]	[mm]	[mm]	[mm]	[N _m]		
BLS M8-14/40/15	BLS0814040015	M8	14 x 60	15	16	40	80	25	8.0	25
BLS M8-14/80/25	BLS0814080025	M8	14 x 100	25	16	80	130	25	13.4	25
BLS M12-20/80/15	BLS1220080015	M12	20 x 105	15	21	80	130	80	26.5	10
BLS M12-20/80/30	BLS1220080030	M12	20 x 105	30	21	80	145	80	29.5	10
BLS M12-20/150/30	BLS1220150030	M12	20 x 175	30	21	150	215	80	43.5	10
BLS M12-20/150/50	BLS1220150050	M12	20 x 175	50	21	150	235	80	46.0	10
BLS M16-25/150/30	BLS1625150030	M16	25 x 185	30	26	150	220	180	70.0	10
BLS M16-25/150/40	BLS1625150040	M16	25 x 185	40	26	150	230	180	72.0	10
BLS M16-25/150/60	BLS1625150060	M16	25 x 185	60	26	150	250	180	76.0	10
BLS M16-25/200/40	BLS1625200040	M16	25 x 235	40	26	200	280	180	89.0	10
BLS M16-25/200/60	BLS1625200060	M16	25 x 235	60	26	200	300	180	95.0	10

Custom lengths available on request.

A4 stainless steel

SUPERPLUS BLS



Threaded stud with hex nut and washer

Material: A4-80 stainless steel

Approvals: ETA-05/0013 – Option 1

Type	Order Code	Thread Size	Ø x Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight	Box Quantity
			d ₀ x h ₁	t _{fix}	d _f	h _{ef}	L	T _{inst}		
			[mm]	[mm]	[mm]	[mm]	[mm]	[N _m]		
BLS M8-14/80/25A4	BLS0814080025A4	M8	14 x 100	25	16	80	130	25	13.4	25
BLS M12-20/80/15A4	BLS1220080015A4	M12	20 x 105	15	21	80	130	80	26.5	10
BLS M12-20/80/30A4	BLS1220080030A4	M12	20 x 105	30	21	80	145	80	29.5	10
BLS M16-25/150/30A4	BLS1625150030A4	M16	25 x 185	30	26	150	220	180	70.0	10
BLS M16-25/150/40A4	BLS1625150040A4	M16	25 x 185	40	26	150	230	180	72.0	10

Custom lengths available on request.

Internally threaded, Carbon steel, zinc plated

SUPERPLUS ILS



Internally threaded sleeve

Material: Grade 8.8 carbon steel, zinc plated and blue passivated

Type	Order Code	Thread Size	Ø x Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight	Box Quantity
			d ₀ x h ₁	t _{fix}	d _f	h _{ef}	L	T _{inst}		
			[mm]	[mm]	[mm]	[mm]	[mm]	[N _m]		
ILS M8-14/80	ILS0814080	M8	14 x 100	-	10	80	93	25	8.7	25

Custom lengths available on request.

Safety Bolt *Expansion Anchor Systems*

SAFETY BOLT

The Safety Bolt is a heavy-duty, twin-cone expansion anchor for use in cracked and non-cracked concrete applications. The Safety Bolt is available in hex-head and countersunk head styles for application versatility.

PERFORMANCE FEATURES:

- High capacity in cracked and non-cracked concrete (C20/25 to C50/60)
- Suitable for interior and exterior applications
- Load range from 2-48 kN (tension) and 5-80 kN (shear)

MATERIAL:

- Grade 8.8 carbon steel
- A4-70 stainless steel

FINISH: Zinc plated and blue passivated (Grade 8.8)

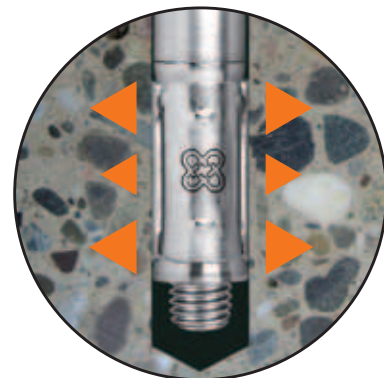
APPROVAL: ETA-06/0108—Option 1—Carbon steel, zinc plated

INSTALLATION: Through-fix installation

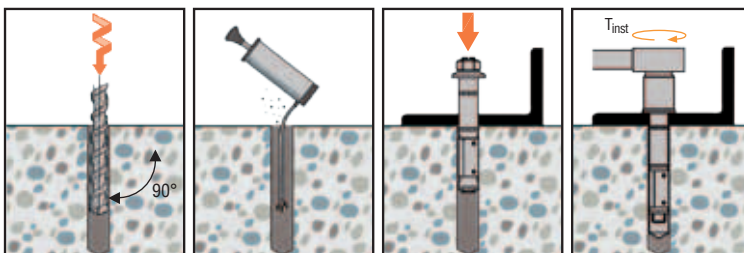
1. Drill hole to specified depth.
2. Clean hole (blowing) with clean, oil-free compressed air
3. Insert anchor through fixture
4. Apply recommended fastening torque with a calibrated torque-wrench

APPLICATIONS: Through-fix installation shown

- Steel construction
- Railings
- Gates
- Lifting systems
- Cable trays
- Machines
- Facades
- Base plates



Installation *Through-fix installation*



Drill hole to specified depth.

Clean hole (blowing) with clean, oil-free compressed air

Insert anchor through fixture

Apply recommended fastening torque with a calibrated torque-wrench



S with hex head screw and domed washer

SK with countersunk headed screw

Safety Bolt Expansion Anchor Systems

Carbon steel, zinc plated

SAFETY BOLT S



Hex head screw and domed washer

Material: Grade 8.8 carbon steel, zinc plated and blue passivated

Approvals: ETA-06/0108 – Option 1

New Type	Old Type	Order Code	Thread Size	Ø x	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight	Box Quantity					
				Depth of Drilled Hole								t _{fix}	d _f	h _{ef}	L	T _{inst}
				[mm]								[mm]	[mm]	[mm]	[mm]	[N _m]
S M6-10/45/5	S 10/20	LS0610045005	M6	10 x 60	5	12	45	70	8	2.7	50					
S M6-10/45/15	S 10/35	LS0610045015	M6	10 x 60	15	12	45	80	8	3.4	50					
S M6-10/45/40	S 10/60	LS0610045040	M6	10 x 60	40	12	45	105	8	4.6	50					
S M8-12/55/5	S 12/25	LS0812055005	M8	12 x 70	5	14	55	80	15	5.8	25					
S M8-12/55/15	S 12/40	LS0812055015	M8	12 x 70	15	14	55	90	15	7.0	25					
S M8-12/55/40	S 12/65	LS0812055040	M8	12 x 70	40	14	55	115	15	9.0	25					
S M10-15/70/5	S 15/30	LS1015070005	M10	15 x 85	5	17	70	95	40	11.0	25					
S M10-15/70/15	S 15/45	LS1015070015	M10	15 x 85	15	17	70	105	40	12.8	25					
S M10-15/70/40	S 15/70	LS1015070040	M10	15 x 85	40	17	70	130	40	16.0	10					
S M12-20/80/5	S 20/35	LS1220080005	M12	20 x 100	5	21	80	113	70	20.8	10					
S M12-20/80/15	S 20/50	LS1220080015	M12	20 x 100	15	21	80	123	70	24.8	10					
S M12-20/80/40	S 20/75	LS1220080040	M12	20 x 100	40	21	80	148	70	29.0	10					
S M16-25/100/5	S 25/40	LS1625100005	M16	25 x 125	5	26	100	145	115	43.4	5					
S M16-25/100/15	S 25/55	LS1625100015	M16	25 x 125	15	26	100	155	115	48.4	5					
S M16-25/100/40	S 25/80	LS1625100040	M16	25 x 125	40	26	100	180	115	56.7	5					
S M20-30/125/15*	S 30/65	S2030125015	M20	30 x 150	15	32	125	180	300	85.9	5					
S M20-30/125/40*	S 30/90	S2030125040	M20	30 x 150	40	32	125	205	300	96.7	5					

Custom lengths available on request.

*Not included in approval.

SAFETY BOLT SK



Countersunk head screw

Material: Grade 8.8 carbon steel, zinc plated and blue passivated

Approvals: ETA-06/0108 – Option 1

New Type	Old Type	Order Code	Thread Size	Ø x	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight	Box Quantity					
				Depth of Drilled Hole								t _{fix}	d _f	h _{ef}	L	T _{inst}
				[mm]								[mm]	[mm]	[mm]	[mm]	[N _m]
SK M6-10/45/6	SK 10/20	LSK0610045006	M6	10 x 60	6	12	45	60	12	2.7	50					
SK M6-10/45/15	SK 10/35	LSK0610045015	M6	10 x 60	15	12	45	70	12	3.4	50					
SK M6-10/45/40	SK 10/60	LSK0610045040	M6	10 x 60	40	12	45	95	12	4.6	50					
SK M8-12/55/10	SK 12/25	LSK0812055010	M8	12 x 70	10	14	55	75	20	5.8	25					
SK M8-12/55/15	SK 12/40	LSK0812055015	M8	12 x 70	15	14	55	85	20	7.0	25					
SK M8-12/55/40	SK 12/65	LSK0812055040	M8	12 x 70	40	14	55	110	20	9.0	25					
SK M10-15/70/10	SK 15/30	LSK1015070010	M10	15 x 85	10	17	70	90	60	11.0	25					
SK M10-15/70/15	SK 15/45	LSK1015070015	M10	15 x 85	15	17	70	100	60	12.8	25					
SK M10-15/70/40	SK 15/70	LSK1015070040	M10	15 x 85	40	17	70	120	60	16.0	25					
SK M12-20/80/15	SK 20/50	LSK1220080015	M12	20 x 100	15	21	80	110	90	24.8	10					
SK M12-20/80/40	SK 20/75	LSK1220080040	M12	20 x 100	40	21	80	135	90	29.0	10					
SK M16-25/100/15	SK 25/55	LSK1625100015	M16	25 x 125	15	26	100	135	190	48.4	5					
SK M16-25/100/40	SK 25/80	LSK1625100040	M16	25 x 125	40	26	100	160	190	56.7	5					

Custom lengths available on request.

Safety Bolt Expansion Anchor Systems**A4 stainless steel****SAFETY BOLT S**

Hex head screw and domed washer
Material: A4-70 stainless steel

New Type	Old Type	Order Code	Thread Size	Ø x Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight [kg/100 pcs]	Box Quantity [pcs]
				d _o x h ₁	t _{fix}	d _f	h _{ef}	L	T _{inst}		
				[mm]	[mm]	[mm]	[mm]	[mm]	[N _m]		
S M6-10/45/15 A4	S 10/35 A4	S0610045015A4	M6	10 x 60	15	12	45	80	10	3.4	50
S M6-10/45/40 A4	S 10/60 A4	S0610045040A4	M6	10 x 60	40	12	45	105	10	4.6	50
S M8-12/55/15 A4	S 12/40 A4	S0812055015A4	M8	12 x 70	15	14	55	90	25	7.0	25
S M8-12/55/40 A4	S 12/65 A4	S0812055040A4	M8	12 x 70	40	14	55	115	25	9.0	25
S M10-15/70/15 A4	S 15/45 A4	S1015070015A4	M10	15 x 85	15	17	70	105	50	12.8	25
S M10-15/70/40 A4	S 15/70 A4	S1015070040A4	M10	15 x 85	40	17	70	130	50	16.0	10
S M12-20/80/15 A4	S 20/50 A4	S1220080015A4	M12	20 x 95	15	21	80	123	80	24.8	10
S M12-20/80/40 A4	S 20/75 A4	S1220080040A4	M12	20 x 95	40	21	80	148	80	29.0	10

Custom lengths available on request.

SAFETY BOLT SK

Countersunk head screw
Material: A4-70 stainless steel

New Type	Old Type	Order Code	Thread Size	Ø x Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight [kg/100 pcs]	Box Quantity [pcs]
				d _o x h ₁	t _{fix}	d _f	h _{ef}	L	T _{inst}		
				[mm]	[mm]	[mm]	[mm]	[mm]	[N _m]		
SK M6-10/45/15 A4	SK 10/35 A4	SK0610045015A4	M6	10 x 60	15	12	45	70	10	3.4	50
SK M6-10/45/40 A4	SK 10/60 A4	SK0610045040A4	M6	10 x 60	40	12	45	95	10	4.6	50
SK M8-12/55/15 A4	SK 12/40 A4	SK0812055015A4	M8	12 x 70	15	14	55	85	25	7.0	25
SK M8-12/55/40 A4	SK 12/65 A4	SK0812055040A4	M8	12 x 70	40	14	55	110	25	9.0	25
SK M10-15/70/15 A4	SK 15/45 A4	SK1015070015A4	M10	15 x 85	15	17	70	100	50	12.8	25
SK M10-15/70/40 A4	SK 15/70 A4	SK1015070040A4	M10	15 x 85	40	17	70	125	50	16.0	25
SK M12-20/80/15 A4	SK 20/50 A4	SK1220080015A4	M12	20 x 95	15	21	80	110	80	24.8	10
SK M12-20/80/40 A4	SK 20/75 A4	SK1220080040A4	M12	20 x 95	40	21	80	135	80	29.0	10

Custom lengths available on request.

Liebig Anchor Expansion Anchor Systems

LIEBIG ANCHOR

The Liebig Anchor is a heavy-duty, general purpose anchor for use in cracked and non-cracked concrete applications.

PERFORMANCE FEATURES:

- High capacity in cracked and non-cracked concrete (C20/25 to C50/60)
- Suitable for interior and exterior applications
- Load range from 2-37 kN (tension) and 5-55 kN (shear)

MATERIAL:

- Grade 8.8 carbon steel
- A4-70 stainless steel

FINISH: Zinc plated and blue passivated (Grade 8.8)

APPROVAL: ETA-06/0123—Option 1—Carbon steel, zinc plated

INSTALLATION: Through-fix installation shown

1. Drill hole
2. Clean hole (blowing)
3. Insert anchor through fixture
4. Apply recommended fastening torque with a calibrated torque-wrench

APPLICATIONS: Through-fix installation shown

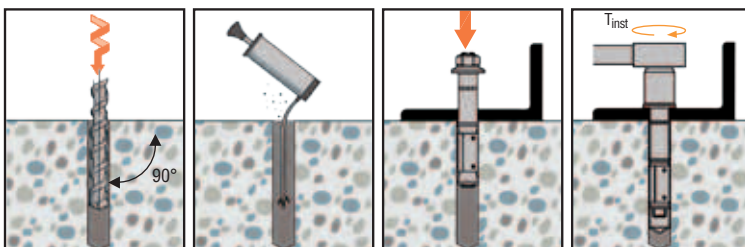
- Steel construction
- Railings
- Gates
- Lifting systems
- Cable trays
- Machines
- Facades
- Base plates



Typ AS



Installation Through-fix installation



Drill hole

Clean hole (blowing)

Insert anchor through fixture

Apply recommended fastening torque with a calibrated torque-wrench



AS with hex head screw and domed washer

Liebig Anchor Expansion Anchor Systems**Carbon steel, zinc plated****LIEBIG ANCHOR AS**

Hex head screw and domed washer

Material: Grade 8.8 carbon steel, zinc plated and blue passivated

Approval: ETA-06/0123 – Option 1

New Type	Old Type	Order Code	Thread-Size	Ø Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight	Box Quantity
				d _o x h ₁	t _{fix}	d _f	h _{ef}	L	T _{inst}		
				[mm]	[mm]	[mm]	[mm]	[mm]	[N _m]		
AS M6-10/45/5	AS 10/0	LAS0610045005	M6	10 x 60	5	12	45	70	8	2.7	50
AS M6-10/45/15	AS 10/15	LAS0610045015	M6	10 x 60	15	12	45	80	8	3.4	50
AS M6-10/45/40	AS 10/40	LAS0610045040	M6	10 x 60	40	12	45	105	8	4.6	50
AS M8-12/55/5	AS 12/0	LAS0812055005	M8	12 x 70	5	14	55	80	20	5.8	25
AS M8-12/55/15	AS 12/15	LAS0812055015	M8	12 x 70	15	14	55	90	20	7.0	25
AS M8-12/55/40	AS 12/40	LAS0812055040	M8	12 x 70	40	14	55	115	20	9.0	25
AS M10-15/65/5	AS 15/0	LAS1015065005	M10	15 x 85	5	17	65	95	50	11.0	25
AS M10-15/65/15	AS 15/15	LAS1015065015	M10	15 x 85	15	17	65	105	50	12.8	25
AS M10-15/65/40	AS 15/40	LAS1015065040	M10	15 x 85	40	17	65	130	50	16.0	10
AS M12-20/80/5	AS 20/0	LAS1220080005	M12	20 x 100	5	21	80	113	75	20.8	10
AS M12-20/80/15	AS 20/15	LAS1220080015	M12	20 x 100	15	21	80	123	75	24.8	10
AS M12-20/80/40	AS 20/40	LAS1220080040	M12	20 x 100	40	21	80	148	75	29.0	10
AS M16-25/100/15	AS 25/15	LAS1625100015	M16	25 x 125	15	26	100	155	170	48.4	5
AS M16-25/100/40	AS 25/40	LAS1625100040	M16	25 x 125	40	26	100	180	170	56.7	5

Custom lengths available on request.

A4 stainless steel**LIEBIG ANCHOR AS**

Hex head screw and domed washer

Material: A4-70 stainless steel

New Type	Old Type	Order Code	Thread-Size	Ø Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Total Length	Installation Torque	Weight	Box Quantity
				d _o x h ₁	t _{fix}	d _f	h _{ef}	L	T _{inst}		
				[mm]	[mm]	[mm]	[mm]	[mm]	[N _m]		
AS M6-10/45/5 A4	AS 10/0 A4	AS0610045005A4	M6	10 x 60	5	12	45	70	10	2.9	50
AS M6-10/45/15 A4	AS 10/15 A4	AS0610045015A4	M6	10 x 60	15	12	45	80	10	3.4	50
AS M8-12/55/15 A4	AS 12/15 A4	AS0812055015A4	M8	12 x 70	15	14	55	90	25	7.0	25
AS M8-12/55/40 A4	AS 12/40 A4	AS0812055040A4	M8	12 x 70	40	14	55	115	25	9.0	25
AS M10-15/65/15 A4	AS 15/15 A4	AS1015065015A4	M10	15 x 85	15	17	65	105	50	12.8	25
AS M10-15/65/40 A4	AS 15/40 A4	AS1015065040A4	M10	15 x 85	40	17	65	130	50	16.0	10
AS M12-20/80/15 A4	AS 20/15 A4	AS1220080015A4	M12	20 x 95	15	21	80	123	80	24.8	10
AS M12-20/80/40 A4	AS 20/40 A4	AS1220080040A4	M12	20 x 95	40	21	80	148	80	29.0	10

Custom lengths available on request.

Titen HD® Heavy Duty Screw Anchor for Concrete and Masonry

The proprietary design of the threads on the Titen HD® anchor hold the key to its performance. During installation, hardened cutting teeth at the tip of the anchor undercut the concrete allowing the rest of the threads to follow with very little friction. The result is a continuous mechanical interlock between the anchor and base material that requires little installation torque.

APPLICATION:

- Structural Steel
- Strut and Pipe Hangers
- Junction Boxes and Control Panels
- Machinery and Equipment
- Tilt-up Panel Braces
- Concrete Formwork and Bracing
- Material Handling: Racking, Mezzanines, Conveyors
- Access Equipment: Ladders, Staircases
- Furniture and Storage
- Safety Equipment: Guardrails, Railings, Fencing
- Mudsills and Ledgers

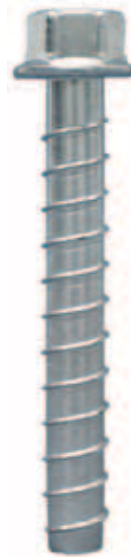
CODES: ICC-ES ESR-3037 (concrete); ICC-ES ESR-1056 (masonry)

PERFORMANCE FEATURES:

- **Cut Installation Time:** No secondary setting or torquing is required. Just drive it and you're done. Install more anchors per hour and reduce labor costs.
- **Cut Installation Torque:** Testing shows that when compared with other screw-type anchors, the Titen HD anchor requires 50% less torque to be installed in concrete. The serrated teeth on the lead threads facilitate cutting, enabling the user to install the anchor faster with less fatigue.
- **Cut Down on Tools:** Just an impact or socket wrench is all you need for installation. No need for separate tools to drive and set the anchor.
- **Cut The Hassle of Removal:** Since the Titen HD anchor is easy to remove, it is ideal for temporary anchoring or applications where fixtures may need to be moved. No torching or grinding required and no steel pieces are left in the concrete to corrode and stain.
- **Cut Lost Washers and Protruding Studs:** The hex washer head is designed to not require a separate washer and provides a clean installed appearance.
- **Cut Inspection Hassles:** Because it is not an expansion anchor, there are no installation torque requirements to verify with the Titen HD anchor. It also has the Simpson Strong-Tie "≠" sign along with the anchor length and diameter stamped into the head, making post-installation inspection a snap.

SUPERIOR PERFORMANCE:

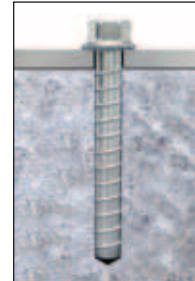
- **Higher Load Capacity:** Rather than one expansion area, the Titen HD anchor has threads along the entire length of the anchor that undercut the base material to efficiently transfer the load.
- **Vibration and Shock Resistance:** The mechanical interlock of the threads and the ratchet teeth on the underside of the head help prevent the anchor from loosening in vibratory conditions. The Titen HD anchor has been tested to 12.6 million vibratory cycles with no performance reductions.
- **Less Spacing and Edge Distance Required:** The Titen HD anchor does not exert expansion forces on the base material. This means greater placement flexibility because anchors can be placed closer to each other or closer to the edge of the base material while maintaining performance.
- **Proprietary Heat Treating Process:** Creates superior surface hardness for cutting into the hardest of base materials, while at the same time maintaining the anchor's ductility.
- **Full Body Diameter:** The diameter of the anchor body is equal to the nominal diameter of the anchor. That means that the body of a 16 mm Titen HD is a full 16 mm. This gives the Titen HD anchor higher shear values than other products which are often undersized.
- **Easy Post-Installation Inspection:** The head is stamped with the Simpson Strong-Tie "≠" sign and the anchor diameter x length in mm.



Titen HD® screw anchor



Serrated teeth on the tip of the Titen HD® screw anchor facilitate cutting and reduce installation torque.



Proprietary Heat Treating Process: Creates superior surface hardness for cutting into the hardest of base materials, while at the same time maintaining the anchor's ductility.



Can be bent to a right angle (90 degrees) and remain intact without snapping or breakage.



Easy Post-Installation Inspection: The head is stamped with the Simpson Strong-Tie "≠" sign and the anchor size in mm.

Titen HD® Heavy Duty Screw Anchor for Concrete and Masonry

INSTALLATION:

Holes in metal fixtures to be mounted should match the diameter range specified in the table.

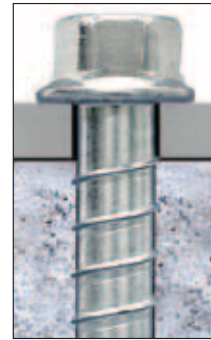
⚠ Caution: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with the base material and will reduce the anchor's load capacity. Use a Titen HD screw anchor one time only. Installing the anchor multiple times may result in excessive thread wear and reduce load capacity.

- Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed. Drill the hole to the specified embedment depth plus 12 mm minimum to allow the thread tapping dust to settle and blow it clean using compressed air. Overhead installations need not be blown clean. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling and tapping.
- Insert the anchor through the fixture and into the hole.
- Tighten the anchor into the base material until the hex washer head contacts the fixture.
- If the anchor will not install completely, remove the anchor and assure that all dust has been evacuated or drill the hole deeper. Begin re-installation of the anchor by hand to prevent cross-threading.
- Do not use impact wrenches to install into hollow CMU.

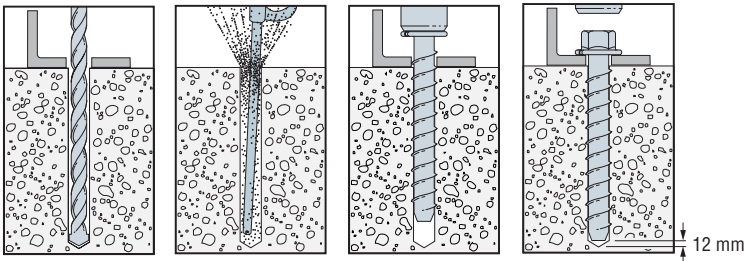
Hole Dimensions

Titen HD Size (mm)	Wrench Size (mm)	Recommended Fixture Hole Size Range (mm)
THD08	13	10 - 12
THD10	15	12 - 14
THD12	18	14 - 16
THD16	24	19 - 22
THD20	30	23 - 26

The max. fixture holes are limited to the outside diameter of the anchor based on ETAG 001, Annex C.



Installation Sequence



Titen HD® Anchor Product Data - Zinc Plated

Size (mm)	Model No.	Drill Bit Dia. (mm)	Wrench Size (mm)	Quantity	
				Per Inner Box	Per Carton
THD08 x 70	THD08070	8	13	50	200
THD08 x 80	THD08080			50	200
THD08 x 100	THD08100			50	200
THD08 x 120	THD08120			50	100
THD08 x 140	THD08140			50	100
THD10 x 80	THD10080	10	15	50	200
THD10 x 90	THD10090			50	200
THD10 x 100	THD10100			50	200
THD10 x 120	THD10120			50	100
THD10 x 140	THD10140			50	100
THD10 x 160	THD10160			50	100
THD12 x 110	THD12110	12	18	20	80
THD12 x 130	THD12130			20	80
THD12 x 150	THD12150			20	80
THD16 x 130	THD16130	16	24	10	40
THD16 x 150	THD16150			10	40
THD20 x 150	THD20150	20	30	5	20
THD20 x 170	THD20170			5	10

Titen HD Anchor Product Data - Mechanically Galvanized

Size (mm)	Model No.	Drill Bit Dia. (mm)	Wrench Size (mm)	Quantity	
				Per Inner Box	Per Carton
THD08 x 70	THD08070MG	8	13	50	200
THD08 x 80	THD08080MG			50	200
THD08 x 100	THD08100MG			50	200
THD08 x 120	THD08120MG			50	100
THD08 x 140	THD08140MG			50	100
THD10 x 80	THD10080MG	10	15	50	200
THD10 x 90	THD10090MG			50	200
THD10 x 100	THD10100MG			50	200
THD10 x 120	THD10120MG			50	100
THD12 x 130	THD12130MG	12	18	20	80
THD16 x 130	THD16130MG	16	24	10	40
THD20 x 150	THD20150MG	20	30	5	20
THD20 x 170	THD20170MG			5	10

1. Mechanical galvanizing meets ASTM B695, Class 65, Type 1, AS3566.2, Class 3. Not for use in highly corrosive or outdoor environments.
2. Other sizes available in MG finish by special order, contact Simpson Strong-Tie for details.

1. Zinc plating meets ASTM B633, SC1, AS3566.2, Class 1.
2. Length is measured from the underside of the head to the tip of the anchor.

Throughbolt WA *Wedge Anchor*

The Throughbolt WA is a medium-duty, general purpose expansion anchor for use in non-cracked concrete.

PERFORMANCE FEATURES:

- Economical, general-purpose anchor
- Approved for use in non-cracked concrete (C20/25 to C50/60)

MATERIAL:

- Carbon steel

FINISH:

- Zinc plated and blue passivated (carbon steel), conforms to AS3566.2, Class 1
- Hot-dipped galvanised, conforms to ASTM B695, Class 65, Type 1; AS3566.2, Class 3

APPROVALS: ETA-11/0080 - Option 7: M8-M16, carbon steel, zinc plated

INSTALLATION:

- Drill hole
- Clean hole (blowing)
- Insert anchor through fixture
- Apply recommended fastening torque with a calibrated torque-wrench

APPLICATIONS:

- Steel construction
- Railings
- Cable trays
- Machines
- Facades
- Ladders

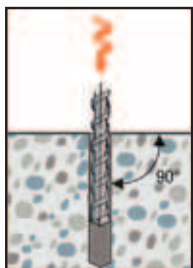


**Throughbolt WA
with hex nut,
sleeve and washer**

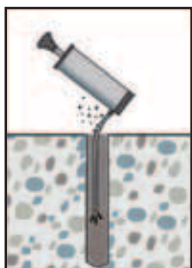
Throughbolt WA Installation Information and Additional Data:

Anchor Type Bolt			Anchor Type				
			6-40	8-45	10-50	12-65	16-80
Maximum total length	L	[mm]	120	165	220	220	220
Drill hole diameter	d _o	[mm]	6	8	10	12	16
Cutting diameter at the upper tolerance limit (max. diameter drill bit)	d _{cut, max} ≤	[mm]	6.45	8.45	10.45	12.50	16.50
Effective embedment depth	h _{ef}	[mm]	40	45	50	65	80
Depth of drilled hole to deepest point	h ₁ ≥	[mm]	55	65	70	90	110
Diameter of clearance hole in the fixture	d _f ≤	[mm]	7	9	12	14	18
Maximum thickness of fixture	t _{fix, max}	[mm]	65	100	140	120	95
Installation torque	T _{inst}	[Nm]	8	15	30	50	100
Width across flats	S _w	[mm]	10	13	17	19	24
Minimum thickness of concrete member	h _{min}	[mm]	100	100	100	130	160
Minimum allowable spacing	S _{min}	[mm]	30	40	50	70	90
Minimum allowable edge distance	C _{min}	[mm]	40	40	50	70	90

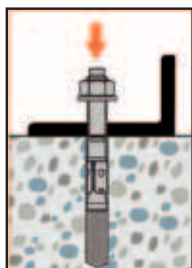
Installation Sequence



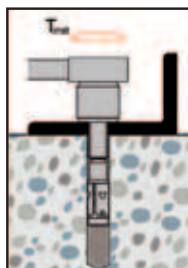
1. Drill hole



2. Clean hole (blowing)




3. Insert anchor through fixture



4. Apply recommended fastening torque with a calibrated torque-wrench

Wedge Anchor Throughbolt WA

Carbon steel, zinc plated

Throughbolt WA																	
With hex nut and washer Material: Carbon steel, zinc plated and blue passivated																	
																	
Model	Carbon Steel SKU Name	Hot-Dip Galvanized SKU Name	ETA Approved	Thread Size	Ø×Depth of Drilled Hole	Max. Fixture Thickness	Ø Fixture Hole	Eff. Embedment Depth	Length	Weight [kg/1000pcs]	Quantity						
											do x h1	tfix	df	hef	L	CTN	BOX
											[mm]	[mm]	[mm]	[mm]	[mm]	[pcs]	[pcs]
WA 6/5	(M6 x 60)	WA06060	WA06060HDG	●	M6	6 x 55	5	7	40	60	14	500	100				
WA 6/20	(M6 x 75)	WA06075	WA06075HDG	●	M6		20			75	16.4	500	100				
WA 6/30	(M6 x 85)	WA06085	WA06085HDG	●	M6		30			85	18.1	500	100				
WA 8/5	(M8 x 68)	WA08068	WA08068HDG	●	M8	8 x 65	5	9	45	68	28.4	250	50				
WA 8/20	(M8 x 83)	WA08083	WA08083HDG	●	M8		20			83	33.0	250	50				
WA 8/30	(M8 x 93)	WA08093	WA08093HDG	●	M8		30			93	36.1	200	50				
WA 8/50	(M8 x 113)	WA08113	WA08113HDG	●	M8		50			113	42.2	200	50				
WA 8/100	(M8 x 163)	WA08163	WA08163HDG	●	M8		100			163	57.5	200	50				
WA 10/10	(M10 x 83)	WA10083	WA10083HDG	●	M10	10 x 70	10	12	50	83	56.1	200	50				
WA 10/20	(M10 x 93)	WA10093	WA10093HDG	●	M10		20			93	61	200	50				
WA 10/30	(M10 x 103)	WA10103	WA10103HDG	●	M10		30			103	65.8	200	50				
WA 10/50	(M10 x 123)	WA10123	WA10123HDG	●	M10		50			123	75.5	200	50				
WA 10/70	(M10 x 143)	WA10143	WA10143HDG	●	M10		70			143	85.2	100	50				
WA 10/100	(M10 x 173)	WA10173	WA10173HDG	●	M10		100			173	99.6	100	50				
WA 10/140	(M10 x 213)	WA10213	WA10213HDG	●	M10		140			213	120.6	100	50				
WA 12/05	(M12 x 85)	WA12085	WA12085HDG		M12	12 x 90	—	14	65	85	84.4	125	25				
WA 12/10	(M12 x 109)	WA12109	WA12109HDG	●	M12		10			109	101.4	100	25				
WA 12/30	(M12 x 129)	WA12129	WA12129HDG	●	M12		30			129	115.4	100	25				
WA 12/50	(M12 x 149)	WA12149	WA12149HDG	●	M12		50			149	129.6	100	25				
WA 12/100	(M12 x 199)	WA12199	WA12199HDG	●	M12		100			199	164.7	50	25				
WA 12/120	(M12 x 219)	WA12219	WA12219HDG	●	M12		120			219	178.8	50	25				
WA 12/140	(M12 x 239)	WA12239	WA12239HDG	●	M12		140			239	202.0	50	25				
WA 12/160	(M12 x 259)	WA12259	WA12259HDG		M12		160			259	225.6	40	20				
WA 16/05	(M16 x 110)	WA16110	WA16110HDG		M16		16 x 110			—	18	80	110	190	80	20	
WA 16/30	(M16 x 151)	WA16151	WA16151HDG	●	M16	30		151	243.4	40			20				
WA 16/50	(M16 x 171)	WA16171	WA16171HDG	●	M16	50		171	269.6	40			20				
WA 16/80	(M16 x 201)	WA16201	WA16201HDG	●	M16	80		201	308.9	20			10				
WA 16/100	(M16 x 221)	WA16221	WA16221HDG		M16	100		221	362.2	20			10				
WA 16/140	(M16 x 261)	WA16261	WA16261HDG		M16	140		261	420.2	20			10				
WA 20/05	(M20 x 120)	WA20120	WA20120HDG		M20	20 x 130	—	22	100	120	332.8	40	10				
WA 20/30	(M20 x 173)	WA20173	WA20173HDG		M20		30			173	441.1	40	10				
WA 20/50	(M20 x 193)	WA20193	WA20193HDG		M20		50			193	490.0	40	10				
WA 20/120	(M20 x 263)	WA20263	WA20263HDG		M20		120			263	652.3	20	10				

Drop-In Anchor Internally Threaded Expansion Shell Anchor

Drop-in anchors are internally threaded, deformation controlled expansion anchors with a preassembled expander plug, suitable for flush mount applications in solid base materials. The anchor is set by driving the expansion plug towards the bottom of the anchor using the setting tool.

The Lipped Drop-In (DIAL) features a lip at the top of the anchor body that keeps the top of the anchor flush with the concrete. This eliminates the need for precisely drilled hole depths and allows for easier flush installation, consistent embedment and uniform rod lengths.

MATERIAL:

Carbon and A4 Stainless steel
(DIAL1030 available in zinc plated carbon steel only)

FINISH:

Zinc plated carbon steel and A4 Stainless steel

INSTALLATION:

- Drill a hole in the base material using the proper diameter carbide drill bit as specified in the table. Drill the hole to the specified embedment depth plus 3 to 5 mm for flush mounting. Blow the hole clean using compressed air. Overhead holes do not need to be blown clean.

CAUTION: Oversize holes will make it difficult to set the anchor and will reduce the anchor's load capacity.

- Insert anchor into hole. Tap with hammer until flush against the surface.
- Using the proper sized Drop-In setting tool (DIAS); drive the expander plug towards the bottom of the anchor until shoulder of setting tool makes contact with the top of the anchor.

TEST CRITERIA:

The Drop-In anchor has been tested in accordance with *ASTM E488 Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements*.

Material Specifications:

Anchor Component	Component Material	
	Zinc Plated Carbon Steel	Stainless Steel
Anchor Body	AISI 1008 Grade 1008	Type A4
Expander Plug	AISI 1008 Grade 1008	Type A4
Thread	Coarse	Coarse



Drop-In



Lipped Drop-In



Drop-In Anchor Setting Tool Product Data

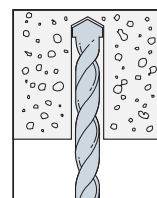
Model No.	Use With	Box Qty.
DIAS06	DIA06	10
DIAS08	DIA08	10
DIAS10	DIA10	10
DIAS12	DIA12	10
DIAS16	DIA16	5
DIAS20	DIA20	5

1. Setting tools sold separately except for DIAL1030.
2. Setting tools for use with carbon steel and stainless steel drop-in anchors.

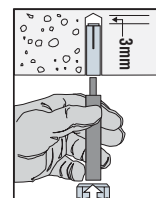


Standard Setting Tool

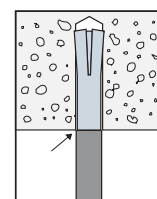
Installation Sequence



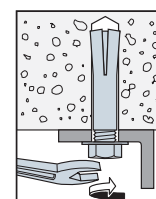
1. Drill hole



2. Insert setting tool



3. Set until flush with concrete surface



4. Insert fixture rod, tighten nut

Drop-In Internally Threaded Expansion Shell Anchor

Drop-In Anchor Product Data - Carbon and Stainless Steel

Rod Size	Carbon Steel Model No.	316 Stainless Model No.	Drill Bit Diameter (mm)	Anchor Length (mm)	Thread Length (mm)	Quantity	
						Box	Ctn.
M6	DIA06	DIA066SS	8	25	10	100	500
M8	DIA08	DIA086SS	10	30	13		
M10	DIA10	DIA106SS	12	40	16	50	250
M12	DIA12	DIA126SS	16	50	21	50	200
M16	DIA16	—	20	65	30	25	100
M20	DIA20	—	25	80	30	20	80



Drop-In Anchor

Lipped Drop-In Anchor Product Data

Rod Size	Carbon Steel Model No.	Drill Bit Diameter (mm)	Anchor Length (mm)	Thread Length (mm)	Quantity	
					Box	Ctn.
M10	DIAL10	12	30	11	50	250



Lipped Drop-In Anchor

Blue Banger Hanger® Cast-In-Place, Internally Threaded Inserts

Blue Banger Hanger® internally threaded inserts are cast into the underside of the concrete deck after being fastened to the top of wood forms or metal deck. Once the concrete has cured, the anchor provides an attachment point for threaded rod used to hang electrical, mechanical and plumbing utilities. The Blue Banger Hanger insert is the only pre-pour insert to offer the patented multi-thread design that enables one size insert to handle multiple diameters of threaded rod.

FEATURES:

- Quick and easy installation saves time and money- no assembly required
- Patented multi-thread design allows each hanger to accept multiple diameters of threaded rod. Three sizes of hangers can handle all applications, reducing contractor and distributor inventories
- Multi-thread design allows threaded rod size to be changed after the anchor is in the concrete
- Machined steel insert with large flanged head provides high tension and shear loads for overhead attachments
- Positive attachment to form keeps the hanger vertical and in the correct position.
- Internal threads eliminate the cost of rod couplers
- The head is stamped with the Simpson Strong-Tie® "S" sign for easy identification before the concrete pour



Patented multi-thread design allows one product to handle up to three rod diameters.



Blue Banger Hanger®
Metal Deck Insert (BBMD)
U.S. Patent 6,240,697B1



Blue Banger Hanger®
Roof Deck Insert (BBRD)
U.S. Patent 6,240,697B1

MATERIAL: Carbon steel

FINISH: Yellow-zinc dichromate

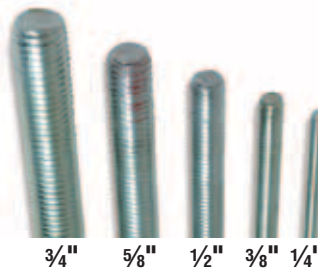
CODES: Factory Mutual 3024378 (except roof deck insert); Underwriters Laboratories File EX3605 (except roof deck insert); Metal deck insert (BBMD) in compliance with UL Standard 2043, 2nd edition, "Fire test for heat and visible smoke release for discrete products and their accessories installed in air-handling spaces."

Blue Banger Hanger Product Data

Hanger Type	For Rod Diameter (in.)	Deck Hole Diameter (in.)	Model No.	Carton Qty.
Metal Deck Insert	1/4, 3/8, 1/2	1 3/16-7/8	BBMD2550	100
	3/8, 1/2, 5/8	1 1/8-1 3/16	BBMD3762	50
	5/8, 3/4	1 3/4-1 1/4	BBMD6275	50
Roof Deck Insert	1/4, 3/8, 1/2	7/8	BBRD2550	50
Wood Form Insert	1/4, 3/8, 1/2	N/A	BBWF2550	200
	3/8, 1/2, 5/8		BBWF3762	150
	5/8, 3/4		BBWF6275	150



Blue Banger Hanger®
Wood Form Insert (BBWF)
U.S. Patent 6,240,697B1



Multiple rod diameters are easily accommodated with the Blue Banger Hanger®.

Blue Banger Hanger® Cast-In-Place, Internally Threaded Inserts

BLUE BANGER HANGER® – METAL DECK-INSERT

FEATURES:

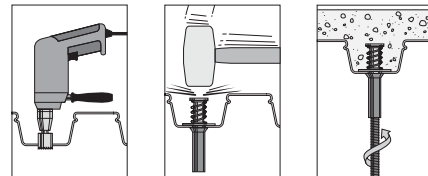
- 75 mm plastic sleeve keeps internal threads clean.
- Extended length of the sleeve allows easy location of the insert even with fireproofing on the underside of the deck. Also provides guidance to align threaded rod with the internal threads.
- Installed height of 50 mm allows the insert to be used on top of, or between, deck ribs.
- Compression spring keeps the insert perpendicular to the deck, even if it is bumped or stepped on after installation.
- Multi-thread design: Each insert accepts 2–3 rod diameters.

INSTALLATION:

- Drill a hole in the metal deck using the appropriate diameter bit as referenced in the table.
- Insert the hanger into the hole and strike the top so that the plastic sleeve is forced through the hole and expands against the bottom side of the deck. The anchor can also be installed by stepping on it.



Metal-Deck Insert Installation Sequence



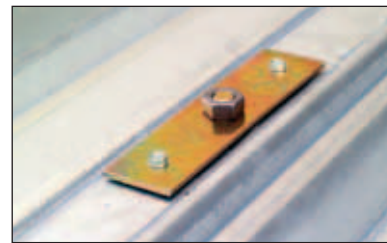
BLUE BANGER HANGER® – METAL-ROOF DECK INSERT

FEATURES:

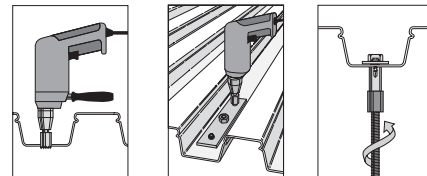
- Low profile design doesn't interfere with roofing material
- Plastic sleeve allows for easy identification and keeps internal threads clean.
- Positive attachment to the roof deck prevents spinning and keeps the hanger in position.
- Pre-staked screws allow quick installation.
- Multi-thread design: The insert accepts 3 rod diameters.

INSTALLATION:

- Drill a hole in the metal deck using the appropriate diameter bit as referenced in the table.
- Insert the hanger into the hole and fasten to the deck with the two pre-staked, self-drilling sheet metal screws provided.



Metal-Roof Deck Insert Installation Sequence



BLUE BANGER HANGER® – WOOD-FORM INSERT

FEATURES:

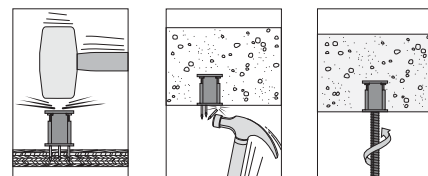
- Blue plastic ring acts as an insert locator when forms are removed.
- Plastic ring creates a countersunk recess to keep internal threads clean from concrete residue.
- Nails snap off with the swipe of a hammer after the forms are removed.
- Multi-thread design: Each insert accepts 2–3 rod diameters.

INSTALLATION:

- Strike the top of the hanger and drive the 3 mounting nails into the forming material until the bottom of the hanger is flush with the plywood. The hanger should be sitting 90° perpendicular to the forming material.
- Once concrete is hardened, and forms are stripped, strike the mounting nails to break them off.



Wood-Form Insert Installation Sequence



Titen® Concrete and Masonry Screws


Titen® screws are 5mm and 6.5mm diameter hardened screws for attaching all types of components to concrete and masonry. Available in hex and phillips head designs in three colors. Use with appropriately sized Titen drill bits included with each box.


Warning: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, use these products in dry, interior and non-corrosive environments only.

MATERIAL: Heat-treated carbon steel

FINISH: Zinc plated with a baked on ceramic coating

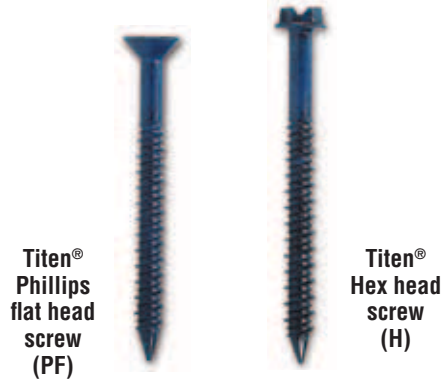
INSTALLATION:

 Caution: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Steps must be taken to prevent inadvertent sustained loads above the listed allowable loads. Overtightening and bending moments can initiate cracks detrimental to the hardened screw's performance. Use the Simpson Strong-Tie installation tool kit as it has a bit that is designed to reduce the potential for overtightening the screw.

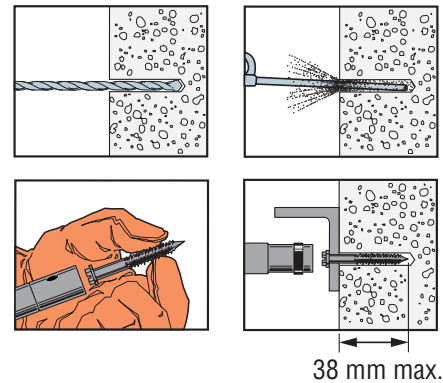
 Caution: Oversized holes in the base material will reduce or eliminate the mechanical interlock of the threads with the base material and will reduce the anchor's load capacity.

- Drill a hole in the base material using the appropriate diameter carbide drill bit as specified in the table. Drill the hole to the specified embedment depth plus 13 mm to allow the thread tapping dust to settle and blow it clean using compressed air. Overhead installations need not be blown clean. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling and tapping.
- Position fixture, insert screw and tighten using drill and installation tool fitted with a hex socket or phillips bit.

Preservative-treated wood applications: Suitable for use in non-ammonia formulations of CCA, ACQ-C, ACQ-D, CA-B, SBX/DOT and zinc borate. Use in dry, interior environments only. Use caution not to damage ceramic barrier coating during installation. Recommendations are based on testing and experience at time of publication and may change. Simpson Strong-Tie cannot provide estimates on service life of screws. Contact Simpson Strong-Tie for additional information.



Installation Sequence



Bulk packaging available for large-volume applications

Standard Blue Titen® Product Data (3/16" diameter)

Size (mm)	Model No. 1	Bit Diameter (in.)	Quantity		
			Box ²	Carton ³	Bulk ⁴
5 x 32mm	TTN18114H	5/32	100	1600	1000
5 x 45mm	TTN18134H			500	
5 x 55mm	TTN18214H			500	
5 x 70mm	TTN18234H			500	
5 x 80mm	TTN18314H			400	
5 x 95mm	TTN18334H			400	
5 x 100mm	TTN18400H			400	
5 x 32mm	TTN18114PF			1600	
5 x 45mm	TTN18134PF			500	
5 x 55mm	TTN18214PF			500	
5 x 70mm	TTN18234PF			500	
5 x 80mm	TTN18314PF			400	
5 x 95mm	TTN18334PF			400	
5 x 100mm	TTN18400PF			400	

1. H Suffix: Hex Head, PF Suffix: Phillips Flat Head.
2. One drill bit is included in each box.
3. Cartons consist of boxes of 100.
4. Bulk Titen Screws come packed in a single carton, and do not include a drill bit. To order, add a "B" onto the end of the model number. Example: TTN18314HB.

Standard Blue Titen® Product Data (1/4" diameter)

Size (mm)	Model No. 1	Bit Diameter (in.)	Quantity		
			Box ²	Carton ³	Bulk ⁴
6.5 x 32mm	TTN25114H	3/16	100	1600	1000
6.5 x 45mm	TTN25134H			500	1000
6.5 x 55mm	TTN25214H			500	1000
6.5 x 70mm	TTN25234H			500	1000
6.5 x 80mm	TTN25314H			400	1000
6.5 x 95mm	TTN25334H			400	1000
6.5 x 100mm	TTN25400H			400	1000
6.5 x 32mm	TTN25114PF			1600	1000
6.5 x 45mm	TTN25134PF			500	1000
6.5 x 55mm	TTN25214PF			500	1000
6.5 x 70mm	TTN25234PF			500	1000
6.5 x 80mm	TTN25314PF			400	1000
6.5 x 95mm	TTN25334PF			400	1000
6.5 x 100mm	TTN25400PF			400	1000

1. H Suffix: Hex Head, PF Suffix: Phillips Flat Head.
2. One drill bit is included in each box.
3. Cartons consist of boxes of 100.
4. Bulk Titen Screws come packed in a single carton, and do not include a drill bit. To order, add a "B" onto the end of the model number. Example: TTN25314HB.

Crimp Multi-Purpose Anchors

The Crimp anchor is an easy-to-install expansion anchor for use in concrete and grout-filled block. The pre-formed curvature along the shaft creates an expansion mechanism that secures the anchor in place and eliminates the need for a secondary tightening procedure. This speeds up anchor installation and reduces the overall cost.

Four Crimp anchor head styles are available to handle different applications that include fastening wood or light-gauge steel, attaching concrete formwork, hanging overhead support for sprinkler pipes or suspended ceiling panels.

WARNING: Industry studies show that hardened fasteners can experience performance problems in wet or corrosive environments. Accordingly, with the exception of the duplex anchor, use these products in dry, interior and non-corrosive environments only.

MATERIAL: Carbon steel

FINISH: Zinc plated and mechanically galvanized

HEAD STYLES: Mushroom, rod coupler, tie-wire and duplex

INSTALLATION:

- Drill a hole using the specified diameter carbide bit into the base material to a depth of at least 13 mm deeper than the required embedment.
- Blow the hole clean of dust and debris using compressed air. Overhead application need not be blown clean. Where a fixture is used, drive the anchor through the fixture into the hole until the head sits flush against the fixture.
- Be sure the anchor is driven to the required embedment depth. The Rod Coupler and Tie-Wire models should be driven in until the head is seated against the surface of the base material.



Mushroom Head

Tie-Wire

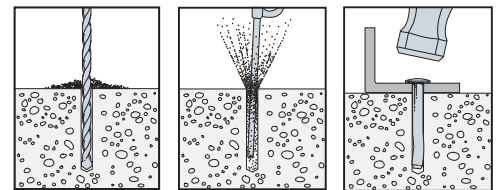
Duplex

Crimp Anchor Product Data

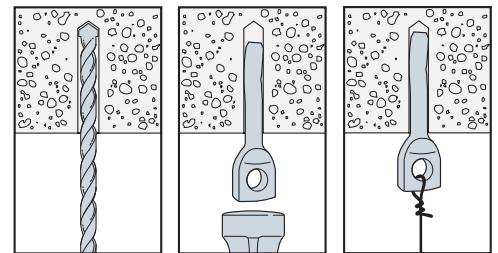
Size (mm)	Model No.	Head Style/ Finish	Drill Bit Dia. (in.)	Min. Fixture Hole Size (in.)	Min. Embed (mm)	Quantity	
						Box	Carton
5 x 32	CD18114M	Mushroom Head – Zinc Plated	3/16	1/4	22	100	1600
5 x 50	CD18200M				32	100	500
6.5 x 25	CD25100M				22	100	1600
6.5 x 32	CD25114M				22	100	1600
6.5 x 38	CD25112M		5/16	1/4	32	100	1600
6.5 x 50	CD25200M				32	100	500
6.5 x 53	CD25212M				32	100	500
6.5 x 75	CD25300M				32	100	500
10 x 50	CD37200M		3/8	7/16	45	25	125
10 x 75	CD37300M				45	25	125
6.5 x 75	CD25300MG	Mushroom Head – Mechanically Galvanized	1/4	5/16	32	100	500
6.5 mm Tie Wire	CD25118T	Tie Wire – Zinc Plated	1/4	N/A	29	100	500
6.5 mm Duplex	CD25234D	Duplex Head – Zinc Plated	1/4	5/16	32	100	500

Crimp Anchor Installation Sequence

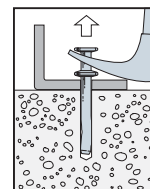
Mushroom Head



Tie-Wire



Duplex



Duplex-head anchor may be removed with a claw hammer

1. Mechanical galvanizing meets ASTM B695, Class 55, Type 1, AS3566.2, Class 3. Intended for some pressure-treated wood sill plate applications. Not for use in other corrosive or outdoor environments. See page 6 for details.

Nailon™ Pin Drive Anchors

Nylon and Zinc Nailon™ anchors are low cost anchors for light-duty applications under static loads.

SPECIAL FEATURES:

- Nylon Nailon anchor: The nylon shell acts as an insulator when used in electrical applications.
- Zinc Nailon anchor: Available with carbon and stainless-steel pins. The pin and head configuration make this anchor tamper resistant.

MATERIAL: Nylon Body: nylon – Pin – Cold-rolled steel
Zinc Body – die cast zinc alloy;
Pin – Carbon and stainless steel (Type 304)

INSTALLATION:

Caution: Oversized holes will make it difficult to set the anchor and will lower the anchor's load capacity.

- ⚠ • Drill a hole in the base material using a carbide drill bit the same diameter as the nominal diameter of the anchor to be installed.
- Drill the hole to the specified embedment depth plus 3 mm for pin extension and blow it clean using compressed air. Alternatively, drill the hole deep enough to accommodate embedment depth and dust from drilling.
- Position fixture, insert Nailon anchor.
- Tap with hammer until flush with fixture; drive pin until flush with top of head.



Nylon Nailon™ Anchor (Mushroom, Round)

Zinc Nailon™ Anchor (Mushroom)

Nylon Nailon™ Product Data and Tension Loads in Normal-Weight Concrete

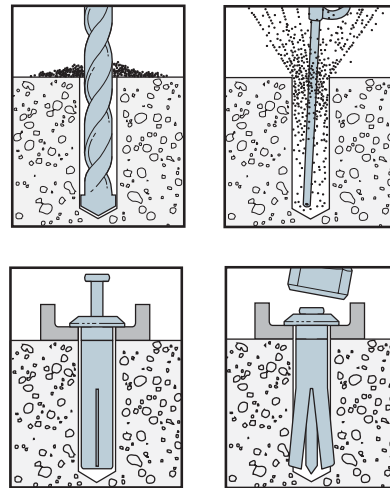


Head Style	Size (mm)	Model No.	Drill Bit Dia. (in.)	Embed. Depth (mm)	Allowable Tension Load (lbs.) $f'_c \geq 3000$ psi	Quantity	
						Box	Carton
R	5 x 25	N18100R	3/16	22	20	100	1600
M		N18100M				100	1600
R	5 x 38	N18112R	1/4	32	25	100	500
R	6.5 x 25	N25100R		22	20	100	1600
M		N25100M	100			1600	
R	6.5 x 38	N25112R	1/4	32	30	100	500
M		N25112M				100	500
M	6.5 x 50	N25200M	1/4	38	40	100	400
R		N25200R				100	400
M	6.5 x 75	N25300M	1/4	50	40	50	200

R = Round Head; M = Mushroom Head

1. Allowable loads listed are based on a safety factor of 4.0.

Installation Sequence



⚠ Not for use in overhead applications

⚠ These anchors are not recommended for eccentric tension (prying) loading. Capacity can be greatly reduced in such applications.

HWA *Hollow Wall Anchors*

The HWA hollow wall anchor expands inside the wall cavity to provide a large bearing area for transfer of loads.

The HWDA hollow wall drive anchor permits installation in gypsum drywall without pre-drilling.

MATERIAL: Expander shell – Cold-rolled steel


INSTALLATION:

HWA:

- Drill hole using the specified diameter bit noted in the table.
- Tap anchor into hole until flush with surface.
- Tighten screw while maintaining constant pressure on the anchor to set.
- Remove screw, install through fixture; reinsert screw into anchor body and tighten until snug against base material.

HWDA:

- Drive anchor into gypsum drywall until head is flush with surface.
- Tighten screw to set anchor.
- Remove screw, install through fixture; reinsert screw into anchor body and tighten until snug against base material.

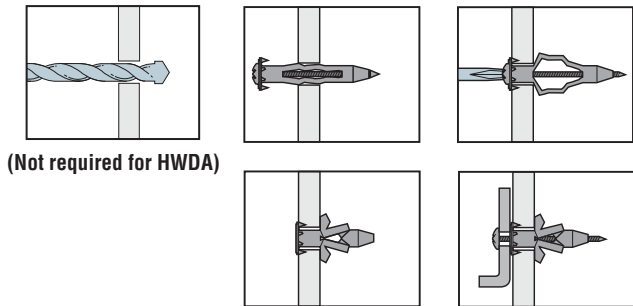
 Use caution not to over-tighten the anchor in drywall applications as this can cause crushing.



HWA Product Data

Size (mm)	Model No.	Base Material Thickness (mm)	Drill Bit Dia. (in.)	Quantity	
				Box	Carton
3XS	HWA12XS	1.5-6	5/16	100	1600
3S	HWA12S	3-12	5/16	100	500
3L	HWA12L	15-22		100	500
5S	HWA18S	3-12	3/8	50	250
5L	HWA18L	16-30		50	250
6.5S	HWA25S	3-12	7/16	50	250
6.5L	HWA25L	16-30		50	250

Installation Sequence



(Not required for HWDA)

HWDA Kit Product Data

Size (mm)	Model No.	Base Material Thickness (mm)	Quantity	
			Box	Carton
3SD	HWDA12SD	3-12	100	500
3LD	HWDA12LD	15-21	100	500

PSATG *Plastic Screw Anchors*


The PSATG is a plastic screw anchor that brings an innovative high-performance design to a broad range of applications and substrates, such as fastening bathroom fixtures, window treatments, picture framing and shelving.

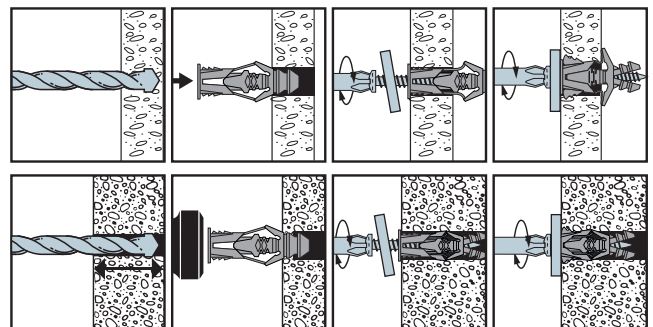
The PSATG features "triple-grip" technology with claws on the neck that hold the anchor stationary while inserting the screw. Two expandable wings also provide gripping power, fastening tightly behind the wall for maximum holding power.

MATERIAL: Polyethylene plastic

INSTALLATIONS:

- Drill a pilot hole into the base material using the appropriate type and size of drill bit
- Insert the PSATG into the hole
- Insert the screw through the fixture and screw into the PSATG
- Turn clockwise until a firm resistance is achieved

 **Caution:** Oversized holes will make it difficult to set the anchor and will impact the anchor's performance



Plastic Screw Anchors with Screws Included

Screw Size (mm)	Model	Description	Drill Bit Required (in.)	Embedment Depth (mm)	Quantity		Applications
					Box	Carton	
#6 x 32	PSATG06-R200	#6 Beige	1/4	38	200	1000	10-12 mm drywall, plaster, brick, concrete, ceramic, stone
#8 x 32	PSATG08-R200	#8 Gray	1/4	38	200	1000	10-12 mm drywall, plaster, brick, concrete, ceramic, stone
#10 x 38	PSATG10-R125	#10 Blue	5/16	45	125	625	10-12 mm drywall, plaster, brick, concrete, ceramic, stone
#12 x 45	PSATG12-R70	#12 Green	3/8	50	70	350	10-12 mm drywall

Sure Wall Drywall Anchors

Sure Wall anchors are designed to self-drill into drywall and provide excellent holding value and greater capacity than screws alone. The standard Sure Wall cuts threads into drywall, greatly increasing the bearing surface and strength of the fastening. The Sure Wall Gripper expands behind the drywall, greatly increasing the bearing surface, resulting in higher loads than the standard Sure Wall. The Sure Wall Nylon Toggle has a die-cast, zinc-drilling point that toggles into position to provide the most bearing surface behind the drywall and the highest capacity in the Sure Wall product line.

FEATURES:

- Self-Drilling: Only a screwdriver needed for installation in gypsum board drywall
- Standard Sure Wall can be used as a fastener in fixtures with sufficiently large holes
- All designs maximize the load-carrying capacity of gypsum drywall
- New designs include screws with the anchors

MATERIAL:

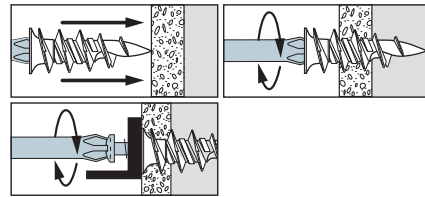
- Sure Wall Standard: Die-cast zinc or reinforced nylon
- Sure Wall Gripper: Reinforced nylon
- Sure Wall Toggle: Reinforced nylon with a die-cast, zinc drilling point/toggle



Sure Wall Product Data

Screw Size (mm)	Model	Style	Quantity		Applications
			Box	Carton	
#6 x 25	SWN06S-R100	Nylon	100	500	10 mm, 12 mm Drywall, Ceiling Tile
#8 x 32	SWN08LS-R100	Nylon	100	500	10 mm, 12 mm Drywall, Ceiling Tile
#6 x 25	SWZ06S-R100	Zinc	100	500	10 mm, 12 mm Drywall, Ceiling Tile
#8 x 32	SWZ08LS-R100	Zinc	100	500	10 mm, 12 mm Drywall, Ceiling Tile

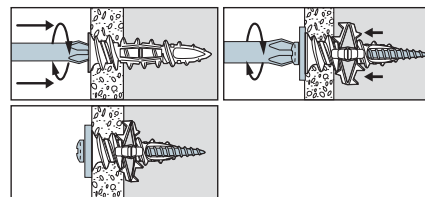
Standard Sure Wall Installation Sequence (Nylon or Zinc)



Sure Wall Gripper Product Data

Screw Size (mm)	Model	Style	Quantity		Applications
			Box	Carton	
#8 x 50	SWNG08S-R50	Gripper Nylon	50	250	10 mm, 12 mm Drywall

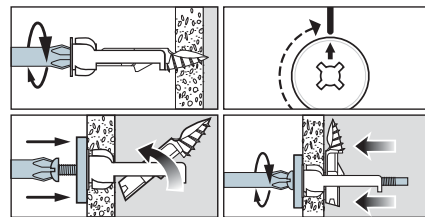
Sure Wall Gripper Installation Sequence



Sure Wall Nylon Toggle Product Data

Screw Size (mm)	Model	Style	Quantity		Applications
			Box	Carton	
3 x 50	SWNT12200-R50	Nylon Toggle	50	250	10 mm, 12 mm Drywall
3 x 75	SWNT12300-R50	Nylon Toggle	50	250	10 mm, 12 mm Drywall
5 x 50	SWNT18200-R50	Nylon Toggle	50	250	10 mm, 12 mm Drywall
5 x 75	SWNT18300-R50	Nylon Toggle	50	250	10 mm, 12 mm Drywall
6.5 x 75	SWNT25300-R25	Nylon Toggle	25	125	10 mm, 12 mm Drywall
6.5 x 100	SWNT25400-R25	Nylon Toggle	25	125	10 mm, 12 mm Drywall

Sure Wall Nylon Toggle Installation Sequence



SWTB Spring Wing Toggle Bolts

The Spring Wing Toggle Bolt is designed for installation in hollow wall construction consisting of base materials such as gypsum wallboard and ungrouted CMU. The Spring Wing Toggle provides a large bearing area to distribute the applied loads. The Spring Wing Toggle Bolt comes complete with Spring Wing Toggle and machine screw (combo phillips and slot head). The Spring Wing Toggle may also be purchased separately (see table below).

MATERIAL: Wing – Cold-rolled steel, zinc plated
Screw – Cold-rolled steel, zinc plated

INSTALLATION:

- Drill hole using the specified diameter bit noted in the table.
- Insert screw through fixture; thread screw into toggle wing.
- Push toggle wing through drilled hole and tighten.



SWTB
Round Head

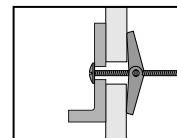
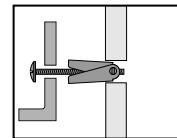
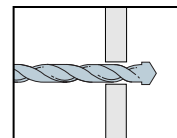
SWTB
Mushroom Head

SWTB Product Data

Machine Screw		Model No.	Drill Bit Dia. (in.)	Wing Spread (mm)	Quantity	
Head ¹ Style	Size (mm)				Box	Carton
R	3 x 50	SWTB12200R	3/8	36	100	500
R/M ²	3 x 75	SWTB12300R/M ²			100	500
R	5 x 50	SWTB18200R	1/2	45	50	250
R/M ²	5 x 75	SWTB18300R/M ²			50	250
R/M ²	5 x 100	SWTB18400R/M ²			50	200
R/M ²	6.5 x 75	SWTB25300R/M ²	1 1/16	53	50	200
R/M ²	6.5 x 100	SWTB25400R/M ²			50	200

1. R = Round Head; M = Mushroom Head.
2. Models available in Round or Mushroom heads.

Installation Sequence



Powder-Actuated Fastening Systems



Time is money on the jobsite. When a railway contractor was falling behind schedule trying to tie down highway baskets, he turned to Simpson Strong-Tie. Once workers started using our PHBC powder-actuated clips, installation times dropped dramatically from about five minutes per anchor to just seconds. Find out what many other professionals already know: Simpson Strong-Tie® Powder-Actuated Fastening Systems offer consistent, high-performance fastening into a variety of substrates.



Important Information Powder-Actuated Fastening Systems

Powder-Actuated Fastening Safety Principles

Before operating any Simpson Strong-Tie Anchor Systems® powder-actuated tool, you must read and understand the Operator's Manual and be trained by an authorized instructor in the operation of the tool. Simpson Strong-Tie highly recommends you read and fully understand the safety guidelines of the tool you use. You must then pass a test and receive a certified operator card to become a Certified Operator of Simpson Strong-Tie tools. The test and Operator's Manual are included with each tool kit and extra copies can be obtained by contacting Simpson Strong-Tie at (61) 02 9831 7700. A certified Operator's Card may also be obtained by completing an online exam. Visit www.strongtie.com.au for details.

GENERAL SAFETY

To avoid serious injury or death:

- ALWAYS make sure that the operator and bystanders wear safety glasses. Hearing and head protection are also recommended.
- ALWAYS post warning signs when powder-actuated tools are in use. Signs should state "Tool in Use" and should be posted within the area where the tool is being used.
- ALWAYS store powder-actuated tools unloaded. Tools and powder loads should be stored in a locked container out of the reach of children.
- NEVER place any part of your body over the front muzzle of the tool even if no fastener is present. The fastener, pin or tool piston can cause serious injury or death in the event of an accidental discharge.
- NEVER transport fasteners or other hard objects in the same pocket or container with powder loads or fuel cells. These objects may strike the energy source, or puncture the fuel cell, thereby igniting and causing serious injury or death.
- NEVER attempt to bypass or circumvent any of the safety features on a powder-actuated tool.
- ALWAYS keep the tool pointed in a safe direction.
- ALWAYS keep your finger off the trigger.
- ALWAYS keep the tool unloaded until ready to use.

INSTALLATION SAFETY

To avoid serious injury or death:

- ALWAYS hold the tool perpendicular (90°) to the fastening surface to prevent ricocheting fasteners. Use the spall guard whenever possible.
- NEVER attempt to fasten into soft, thin, brittle or very hard materials such as drywall, light gauge steel, glass, tile or cast iron as these materials are inappropriate. Conduct a pre-punch test to determine base material adequacy.
- NEVER attempt to fasten into soft material like wood or drywall (fastening through soft materials into an appropriate base material may be allowed if the application is appropriate).
- NEVER attempt to fasten to a spalled, cracked or uneven surface.



Safety equipment, such as safety glasses and ear plugs, are recommended when using powder-actuated tools.

Extension Poles for Powder-Actuated Tools



Advantages:

- Modular lengths – 0.6 m, 1.8 m, 2.4 m
- Easy jobsite storage
- Eliminates need for scaffolding
- Rugged and durable design

Extension Pole Tool for PTP-27L, PTP-27SMAGR, and PTP-27LMAGR

Model	Description	Length
PET-6PKT	Complete 6 ft. tool, with boot, handle and 1 extension	1.8 m
PET-8PKT	Complete 8 ft. tool, with boot, handle and 2 extensions	2.4 m
PETH2	Handle	0.6 m
PETBPA	Tool boot for PTP tool series	N/A
PETS2	Pole extension	0.6 m
PETS4	Pole extension	1.2 m

Extension Pole Tool for PT-27

Model	Description	Length
PET-6SMKT	Complete 6 ft. tool, with boot, handle and 1 extension	1.8 m
PET-8SMKT	Complete 8 ft. tool, with boot, handle and 2 extensions	2.4 m
PETH2	Handle	0.6 m
PETBSM	Tool boot for standard and modular tools	N/A
PETS2	Pole extension	0.6 m
PETS4	Pole extension	1.2 m

PTP-27L & PTP-27LMAGR Premium Tools

FEATURES:

- **PTP-27L:** Automatic fastening: no sliding barrel, just load and shoot
- **PTP-27LMAGR:** Fully automatic tool with fastener magazine; can be converted to a single-shot tool

BOTH TOOLS FEATURE:

- Adjustable power for fastening versatility
- Easy disassembly for cleaning and maintenance
- No manual resetting of piston required
- Operator comfort: cushioned grip, reduced recoil and sound dampening muffler for quiet operation

SPECIFICATIONS:

- Fastener Length:
PTP-27L – 12 mm thru 65 mm (75 mm or 100 mm washered)
PTP-27LMAGR – 16 mm thru 75 mm
- Fastener Type: .300" or 8 mm diameter
- Firing Action: PTP-27L – Automatic
PTP-27LMAGR – Fully automatic
- Load Caliber: .27 strip loads, brown through purple (Levels 2–6)
- Length: 438 mm (PTP-27L), 495 mm (LMAGR)
- Weight: PTP-27L – 3 kg.
PTP-27LMAGR – 4 kg.

KEY FASTENING APPLICATIONS:

- Wood-framing applications
- Washered-pin installation (PTP-27S and PTP-27L only)
- Insulation fastening (PTP-27S and PTP-27L only)
- Forming work

TOOL IS SOLD IN A RUGGED TOOL BOX COMPLETE WITH:

- Operator's manual
- Spall suppressor
- Tools for disassembly
- Safety glasses / ear plugs
- Tool lubricant
- Cleaning brushes
- Operator's exam and caution sign
- Tool box also sold separately
- Gloves

OPTIONS:

- Extension pole tool for the PTP-27L available in 1.8 m and 1.4 m lengths.
- 1.8 m Tool: PET-6PKT
2.4 m Tool: PET-8PKT
- Single shot conversion kit (PTP-27LXCON)

NEW



Adjustable power increases versatility

PTP-27LMAGR



The patent pending, quick-disconnect baseplate makes it easy to convert the PTP-27LMAGR from a magazine to a single-shot tool



Extension Pole Tool (for the PTP-27L and PTP-27LMAGR)
See page 61 for details



The full line of Simpson Strong-Tie® Powder Loads and Fasteners begins on page 64.

Common Repair Parts - PTP-27L

Description	Model No.
Baseplate	PTP-274800
Nosepiece	PTP-273820
Piston	PTP-273320
Piston Disc	PTP-273306
Rubber Returner	PTP-274305

Common Repair Parts - PTP-27LMAGR

Description	Model No.
Magazine (Complete)	PTP-LMAGR
Nosepiece	PTP-276820
Nosepiece Screw	PTP-275826
Piston	PTP-276320
Piston Disc	PTP-273306
Rubber Returner	PTP-274305

1. See page 65 for tool repair and maintenance kits. Complete tool schematics and parts list available at www.strongtie.com.au.

PT-27 General-Purpose Tool

FEATURES:

- Reliable design of the world's most popular tool
- Semi-automatic and fast cycling
- Engineered for continuous use, high reliability and low maintenance

SPECIFICATIONS:

- Fastener length: 12 mm through 65 mm (72 mm for wood fixing (PHN-72A only), 75 mm or 100 mm washered)
- Fastener Type: .300" or 8 mm headed fasteners or 6.5 mm-20 threaded studs
- Firing Action: Semi-automatic
- Load Caliber: .27 strip loads, brown through red (Levels 2-5)
- Length: 342.9 mm
- Weight: 2.38 kg.

KEY FASTENING APPLICATIONS:

- Acoustical ceilings
- Electrical applications
- Framing members
- Drywall track
- Water proofing material and/or lathing

TOOL IS SOLD IN A RUGGED TOOL BOX COMPLETE WITH:

- Operator's manual
- Spall suppressor
- Tools for disassembly
- Safety glasses / ear plugs
- Tool lubricant
- Cleaning brushes
- Operator's exam and caution sign

OPTION:

- Extension pole tool available in 1.8 m and 2.4 m lengths.
- 1.8 m Tool: PET-6SMKT
- 2.4 m Tool: PET-8SMKT

Common Repair Parts

Description	Model No.
Annular Spring	PT-301014
Ball Bearing (6 mm)	PT-301013
Barrel	PT-301006
Baseplate	PT-301009
Piston - Concave (includes ring)	PT-301217
Piston - Flat (includes ring)	PT-301903
Piston Ring	PT-301208
Piston Stop	PT-301012
Shear Clip	PT-301011

1. See page 65 for tool repair and maintenance kits. Complete tool schematics and parts list available at www.strongtie.com.au.



PT-27



The full range of Simpson Strong-Tie® Powder Loads and Fasteners is on page 64.



Extension Pole Tool - See page 61 for details

Powder Loads and Fasteners For Simpson Strong-Tie® Powder-Actuated Tools

.27 Caliber Plastic, 10-Shot Strip Loads

Description	Model	Pack Qty.	Carton Qty.	Compatible Tools	
				Simpson Strong-Tie	Others
.27 Cal. - Brown (Level 2)	P27SL2	100	10,000	PTP-27L PTP-27MAGR PTP-27S PTP-27SMAGR PT-27	DX-350, DX-351, DX-36, DX-A40 (except PT27SL2), DX-A41 (except PT27SL2 and PT27SL3), DX-460, DX-450, DX-451, System 1H, P-36B, A-40B, A-41B, Cobra and most .27 caliber-clone tools
.27 Cal. - Green (Level 3)	P27SL3	100	10,000		
.27 Cal. - Yellow (Level 4)	P27SL4	100	10,000		
.27 Cal. - Red (Level 5)	P27SL5	100	10,000		
.27 Cal. - Purple (Level 6)	P27SL6	100	10,000		DX-450, DX-451, DX-A41



P27SL

8 mm Headed Fasteners with 3.7 mm Shank Diameter

Length mm (in.)	Model	Pack Qty.	Carton Qty.	Compatible Tools	
				Simpson Strong-Tie	Others
14 Knurled	PHN-14K	100	1,000	PTP-27* PTP-27AL* PTP-27ASX** PTM-27 PT-27 PT-25S PT-22 PT-22GS PT-22H	DX-350, DX-36, DX-400E, DX-A40, DX-460, DX-A41, System 1, DX-351 and 8 mm tools.
16 Knurled	PHN-16K	100	1,000		
19 Knurled	PHN-19K	100	1,000		
22	PHN-22	100	1,000		
27	PHN-27	100	1,000		
32	PHN-32	100	1,000		
37	PHN-37	100	1,000		
42	PHN-42	100	1,000		
47	PHN-47	100	1,000		
52	PHN-52	100	1,000		
57	PHN-57	100	1,000		
62	PHN-62	100	1,000		
72	PHN-72A	100	1,000		

*Up to 64 mm

**Up to 38 mm



PHN

8 mm Headed Fasteners with 3.7 mm Shank Diameter and 25 mm Metal Washers

Length mm (in.)	Model	Pack Qty.	Carton Qty.	Compatible Tools	
				Simpson Strong-Tie	Others
27	PHNW-27	100	1,000	PTP-27 PTP-27AL PTP-27ASX* PT-27 PT-25S*	DX-350, DX-36, DX-400E, DX-A40, DX-A41, DX-460, System 1, DX-351 and 8 mm tools.
32	PHNW-32	100	1,000		
37	PHNW-37	100	1,000		
42	PHNW-42	100	1,000		
47	PHNW-47	100	1,000		
52	PHNW-52	100	1,000		
57	PHNW-57	100	1,000		
62	PHNW-62	100	1,000		
72	PHNW-72	100	1,000		

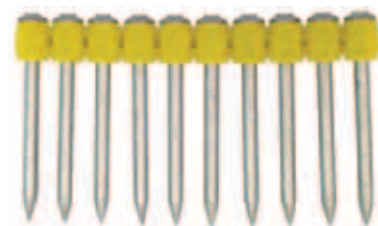
*Up to 51 mm (2")



PHNW

Collated Fasteners - 8 mm Headed with 3.7 MM Shank Diameter

Length mm(in.)	Model	Pack Qty.	Carton Qty.	Compatible Tools	
				Simpson Strong-Tie	Others
14 Knurled	PHSNA-14K	100	1,000	PTP-27ASMAGR (thru 32 mm) PTP-27ALMAGR (thru 73 mm) PTP-27LMAGR (thru 72mm) PTP-27SMAGR (thru 32mm)	DX-A40 with magazine, DX-A41 with magazine, DX-351, DX-460 with magazine
16 Knurled	PHSNA-16K	100	1,000		
19	PHSNA-19	100	1,000		
19 Knurled	PHSNA-19K	100	1,000		
22	PHSNA-22	100	1,000		
27	PHSNA-27	100	1,000		
32	PHSNA-32	100	1,000		
37	PHSNA-37	100	1,000		
42	PHSNA-42	100	1,000		
47	PHSNA-47	100	1,000		
52	PHSNA-52	100	1,000		
57	PHSNA-57	100	1,000		
62	PHSNA-62	100	1,000		
72	PHSNA-72	100	1,000		



PHSNA

Powder-Actuated Tool Repair and Maintenance Kits

Powder-Actuated Tool Repair and Maintenance Kits

Tool	Kit Model No.	Description	Contents
PT-27	PT-27PK1	Normal wear part replacement kit	5 Shear Clips (Part No. PT-301011)
			1 Annular Spring (Part No. PT-301014)
			1 Piston Stop (Part No. PT-301012)
			3 Ball Bearings (Part No. PT-301013)
			1 Piston (Part No. PT-301903)
			2 Piston Rings (Part No. PT-301208)
			1 Nosepiece (Part No. PT-301010)
All	PT-MK1	Tool cleaning kit	1 Cleaning Brush - Wire (Part No. BRUSH 125)
			1 Cleaning Brush 19 mm (¾") Diameter (Part No. BRUSH 25)
			1 Cleaning Brush 6.4 mm (¼") Diameter (Part No. BRUSH 75)
			(1) 3.2 mm (⅛") Hex Wrench (Part No. MW-18)
			(1) 4.8 mm (⅜") Hex Wrench (Part No. MW-316)
			(1) 5 mm Hex Wrench (Part No. MW-5)

Project Referrals



Mechanical Anchors

Liebig **Superplus Undercut Anchor**



Superplus Self-undercut Anchor

The undercut anchor for professional and efficient fixing without special tools.



England- London
Old Stock Exchange Building
Used in building renovation



Slovenia
Used in fixture installation in tunnel

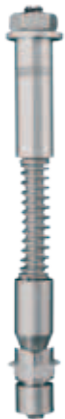


Germany- Troisdorf
Used in silo anchoring



Germany
Crane anchoring

Liebig **Ultraplus Preloaded Anchor**



Ultraplus Undercut Anchor

Safe fixing with mechanical interlock anchoring. "Positive undercutting" allows perfect bearing of the segments and ensures reliable transmission of the load into the concrete. When the ultimate in safety and strength is required.



Europe North Sea
Used in oil derrick



Germany Brusbüttel
Used in power plant anchoring



Germany
Equipment anchoring



Germany
Used in nuclear power plant

Mechanical Anchors

Titen HD® screw anchor



China- Beijing
Olympic Velodrome Stadium
Roof structure anchoring



USA- California
Pipe system anchoring



China- Beijing
Steel structure anchoring



USA- California
Factory machinery anchoring



USA- California
Oakland International Airport
Lifting slabs in runway repair



UAE- Dubai
Metro Rail System
THD used in stations



USA- California
Federal Emergency Management Agency
Rescue drill for quick lifting



China- Shenyang
Subway cassion anchoring



Titen HD® screw anchor

The Titen HD® anchor is a patented, high-strength screw anchor for concrete and masonry. It is designed for optimum performance in both cracked and uncracked concrete.



Specialized heat treating process creates superior surface hardness, while the anchor body remains ductile.

Structural Adhesives

Formulas to meet any need



ET-HP™ Anchoring Adhesive

ET-HP® is an economical two-component, high solids, epoxy based system for use as a high-strength, non-shrink anchoring and grouting material.



SET-XP®

SET-XP® is a 1:1 two component, high solids epoxy-based anchoring adhesive formulated for optimum performance in both cracked and uncracked concrete.

Epoxy Anchoring Adhesive



China- Beijing
Worker's Olympic Stadium
Renovation work



Indian Ocean- Seychelles Islands
Marine Conservation Society
Adhesion of electronic monitoring
devices to endangered sea turtles



USA- California
Ferry Building
Renovation and seismic upgrade of
historic structure



USA- California
San Francisco-Oakland Bay Bridge
Seismic upgrade



USA- Missouri
Poplar Street Bridge
Seismic upgrade



USA- California
Richmond-San Rafael Bridge
Seismic upgrade



USA- Texas
Ellington Airfield
Airport runway extension



UAE- Dubai
Elite Tower
Dowelling of floors to core wall

Structural Adhesives

Epoxy Anchoring Adhesive



UAE- Dubai
Jumeriah Heights
General dowelling



Thailand- Hua Hin
Intercontinental Hotel
Wet hole rebar installation



Qatar- Doha
Doha Tower
Dowelling of floors to core wall



Qatar- Doha
Navigation Tower
Dowelling of floors to core wall



Qatar
Las Raffan Gas plant
Dowelling of foundations



Qatar- Doha
St. Regis Hotel at the Pearl
Rebar dowelling



Qatar- Doha
Dubai Tower
Dowelling of floors to core wall



USA- California
Tujung Dam
Seismic Upgrade



Qatar- Doha
New Doha International Airport
General dowelling for hangers and terminals



UAE- Abu Dhabi
ET-HP™ used in Yas Island Ferrari
Building at Abu Dhabi F1 race track



Thailand- Bangkok
ET-HP™ used in Airport rail link
Track and general anchoring



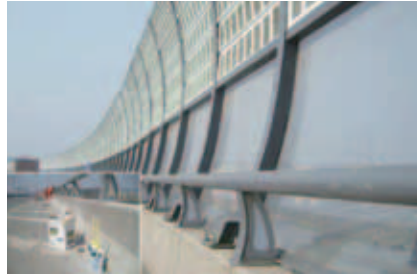
Thailand- Bangkok
IRR Elevated Highway
Rebar dowelling

Structural Adhesives

Epoxy Anchoring Adhesive



China- Hebei
Qinhuangdao
Caisson tube anchoring



China- Tianjin
Highway sound barrier anchoring



China- Tianjin
Highway crash barrier anchoring



China- Tianjin
Seaport
Damp condition fender anchoring



China- Shandong
Seaport
Loading arm, equipment anchoring



China- Henan
Seaport
Fender, mooring, railing large diameter anchoring



China- Liaoning
Seaport
Damp condition large diameter fender anchoring



China- Henan
Seismic upgrade of bridge



China- Hebei
Steel structure anchoring



China- Tianjin
Factory equipment anchoring



China- Beijing
CCTV Building
Used in steel anchoring



China- Beijing
Albemarle Building
Renovation work

Structural Adhesives

Acrylic Anchoring Adhesive



California- San Diego
AT-HP® Used in dowelling for column enlargement



Canada- Prince Edward Island
Confederation Bridge
Below freezing temperature installation



USA- Illinois
Wintertime highway repair



USA- Wisconsin
University of Wisconsin
Stadium seating installation



USA- New York
Oak Pointe Railroad Bridge
Bridge and track renovation



China- Tianjin
Seaport
Berth renovation



China- Tianjin
Steel anchoring



USA- California
Federal Emergency Management Agency
Rescue drill for quick lifting

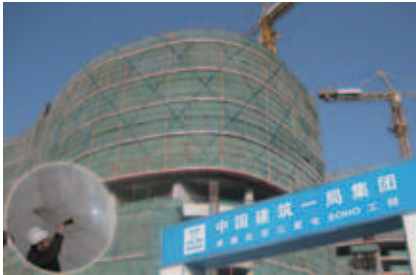


AT-HP® Fast Cure Anchoring Adhesive

AT-HP® is formulated for use in all types of weather, AT-HP is designed to dispense easily and cure at temperatures down to -18°C. Fast 30 minute cure at 21°C.

Structural Adhesives

Acrylic Anchoring Adhesive



China- Beijing
Sanlitun SOHO Building
Structural anchoring



China- Harbin
High speed railway anchoring



China- Shandong
Railway bridge renovation



China- Hebei
Seaport
Winter time equipment anchoring



China- Beijing
Wintertime bridge repair



China- Tianjin
Steel structure anchoring



China- Beijing
Fixture anchoring in hollow block wall with screen tube system



China- Tianjin
Winter time and wet weather anchoring



China- Shandong
High speed railway line, Addition of electrical line poles



China- Tianjin
Light rail anchoring

Other Products

ETI Crack Injection Structural Repair Epoxy



China- Gansu
Bridge renovation and structural crack repair



USA- California
Structural crack repair of large swimming pool



Pacific Islands- Guam
Charter House
Structural crack repair



USA- San Francisco, CA
Honda car dealer structural floor repair
ETI and pasteover above and below crack surface



ETI Injection Epoxy

Structural crack repair in concrete does not have to require expensive equipment or mixing. This system is easy to use with no waste. Meets ASTM C881 requirements for structural strength.

Other Products

Crack-Pac® Flex H₂O® Polyurethane Injection Adhesive

Crack-Pac® Flex H₂O® Polyurethane Injection Adhesive



- Flexible crack sealer
- Expands to fill cracks and voids
- For dry, wet and actively leaking cracks
- Single tube product can dispense with a standard caulking tool



China- Beijing
Damp condition leak repair



U.S.A.- California
Active leak repair

Drop-In Anchors

Drop-in Anchor

Drop-in anchors are internally-threaded, deformation-controlled expansion anchors with a preassembled expander plug, suitable for flush mount applications in solid base materials.



U.S.A.- New York
City parking garage
Drop Ins used in interior mechanical work

Powder-Actuated Fastening System



PTP-27LMAGR Tool



UAE- Dubai
Dubai Mall
P.A.T. system used for interior finishing work

Anchor Selection Software

Anchor Selector™ Software for ETAG



Anchor Selector for ETAG software helps Designers decipher the most appropriate cracked- and noncracked-concrete anchor solutions among numerous Simpson Strong-Tie Anchor Systems mechanical and

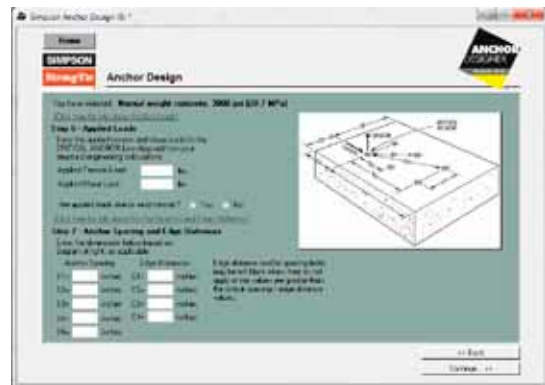
adhesive anchors. With its easy-to-use graphical interface, Anchor Selector software for ETAG accelerates the design process by eliminating the need for tedious calculations by hand that would otherwise be necessary to determine cracked-concrete anchor solutions.



Anchor Designer™ for Allowable Stress Design



For applications where ACI 318 doesn't apply, we still have the original **Anchor Designer for Allowable Stress Design Software**. We'll continue to keep this program updated with the latest technical information so it can continue to be a valuable tool for anchor specification.



New: the Adhesive Cartridge Estimator for iPhone®, iPad® and Android™!

Simpson Strong-Tie is proud to introduce our new Adhesive Cartridge Estimator (ACE) mobile app. This app, compatible with iOS (iPhone, iPad and iPod touch®) and Android mobile devices, quickly calculates the number of cartridges of Simpson Strong-Tie Anchoring Adhesive necessary to complete your specific installation. Once downloaded, the user selects the type of anchor insert (All-thread rod or rebar, including plastic or stainless steel screen tubes), hole diameter, installation depth, and number of anchors, and ACE instantly calculates the approximate quantity of cartridges in all available cartridge or bulk sizes. The ACE app supports SET-XP®, SET, ET-HP™ (formerly ET), EDOT, and AT Anchoring Adhesives. The ACE app is a free download available in the App Store and Android Market.

Apple, iPad, iPhone, iPod touch, and iTunes are trademarks of Apple Inc., registered in the U.S. and other countries. App Store is a service mark of Apple Inc.

Android is a trademark of Google Inc.



Notes

A large area of the page is filled with horizontal dotted lines, providing a space for handwritten notes.

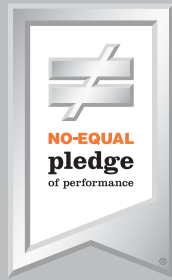


Notes

A large area of the page is filled with horizontal dotted lines, providing space for handwritten notes.

Notes

A large area of the page is filled with horizontal dotted lines, providing a space for handwritten notes.



Every day we work hard to earn your business, blending the talents of our people with the quality of our products and services to exceed your expectations. This is our pledge to you.

Simpson Strong-Tie Australia Pty Limited

Unit 1/16 Kenoma Place,
Arndell Park, NSW 2148
Australia
Tel: (61) 02 9831 7700
Fax: (61) 02 9831 2726

Simpson Strong-Tie New Zealand

28 Arrenway Drive
Albany, Auckland 0632
New Zealand
Tel: (64) (0) 9 477 4440
NZA Fax: (09) 475 9724